APPENDIX J

Erosion Modeling, Sediment Transport Modeling, and Salt Loading

Technical Report

HydroGeo, Inc.
Surface & Groundwater Hydrology

TECHNICAL REPORT

EROSION MODELING, SEDIMENT TRANSPORT MODELING, AND SALT LOADING

PINEDALE ANTICLINE PROJECT SUBLETTE COUNTY, WYOMING

Prepared by

HydroGeo, Inc.
126 Elk Avenue
P.O. Box 2979
Crested Butte, CO 81224

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1. INTRODUCTION

The potential for environmental impacts associated with erosion, sediment transport and salinity has been identified as an issue for further investigation in the Supplemental Environmental Impact Statement (SEIS) for continued development of the Pinedale Anticline Project Area (PAPA). The purpose of this technical report is to describe the conceptual model of the watershed hydrology, summarize the hydrologic transport modeling methods, and to present modeling results that simulate potential impacts resulting from erosion, sedimentation, and salinity.

1.1 Modeling Objectives

The goals of the sediment transport and salinity modeling were to simulate potential erosion and sediment loads entering the Green, New Fork, and Big Sandy rivers and leaving the PAPA boundary and to estimate the potential for salinity loading in the Green and the Big Sandy rivers. The modeling was designed to simulate sediment loading under the following seven conditions:

- Assuming No Disturbance in the PAPA Area (baseline conditions)
- Under the Current Conditions (end of 2006)
- Under the No Action Alternative(end of 2011)
- Under the Proposed Action Alternative (end of 2011)
- Under the Proposed Action Alternative (end of 2023)
- Under Alternative C (end of 2011)
- Under Alternative C (end of 2023)

The results of the watershed modeling for erosion were expressed in soil loss of kilograms per hectare per year. The results of the watershed modeling for sediment transport were expressed in kilograms of sediment per year at the PAPA boundary and in percentage increase over a non-disturbance baseline case and over the current conditions.

1.2 Model Selection

Two different models were chosen to simulate long-term and short-term storm-related erosion and sediment transport for two different spatial scales.

Spatial scale is an important criterion in the selection of a model because the storage characteristics vary at different watershed scales, that is, large watersheds have well developed channel networks and a channel phase, and thus, channel storage is dominant. Such watersheds are less sensitive to short duration, high intensity rainfalls. Alternatively, small watersheds are dominated by the land phase and overland flow, thus they have a relatively less conspicuous channel phase and are highly sensitive to high intensity, short duration rainfalls (Burns et al, 2004).

Storm event watershed modeling was performed using the Kinematic Runoff and Erosion Model (KINEROS2), developed by the U.S. Department of Agriculture (USDA, 2005). KINEROS2 is an event-oriented physically based model that describes the processes of interception, infiltration, surface runoff, and erosion from small agricultural and urban watersheds. KINEROS2 utilizes a network of channels and planes to represent a watershed and the kinematic wave method to route water off the watershed. It is a physically-based model designed to simulate runoff and erosion for single storm events in small watersheds less than approximately 100 km^2 (10,000 hectares or 24,711 acres). Considering this, KINEROS2 was suitable to model the ephemeral drainages within the PAPA, but could not be used to model the large watersheds of the Green River or the New Fork River.

The model program SWAT (Soil and Water Assessment Tool) was used to simulate large patterns of change in erosion on a large scale assessment over a longer period of time for the Green and New Fork rivers watersheds. SWAT is a distributed lumped-parameter model developed by the USDA Agricultural Research Service (ARS) to predict the impact of land management practices on water, sediment, and agricultural chemical yields in large (basin scale) complex watersheds with varying soils and land use and management conditions over long periods of time (> 1 year). SWAT is a continuous-time model, i.e., a long-term yield model, using daily average input values, and is not designed to simulate detailed, single-event flood routing. Major components of the SWAT model include: hydrology, weather generator, sedimentation, soil temperature, and groundwater and lateral flow (Burns et al, 2004).

Both SWAT and KINEROS2 models were implemented using a public domain geographic information system (GIS) interface, the AGWA (Automated Geospatial Watershed Assessment) tool (Burns et al, 2004). This interface operates in ArcView 3.x GIS and performed the automated parameterization for both models for specified watersheds and basins.

Results from both models are presented for the sixth-level sub-watershed within the PAPA. Sixth level sub-watersheds have a 12-digit Hydraulic Unit Code (HUC). A sub-watershed is defined as typically having an area of 10,000 to 40,000 acres.

1.3 Impact Analysis Approach

The following conditions/alternatives were modeled:

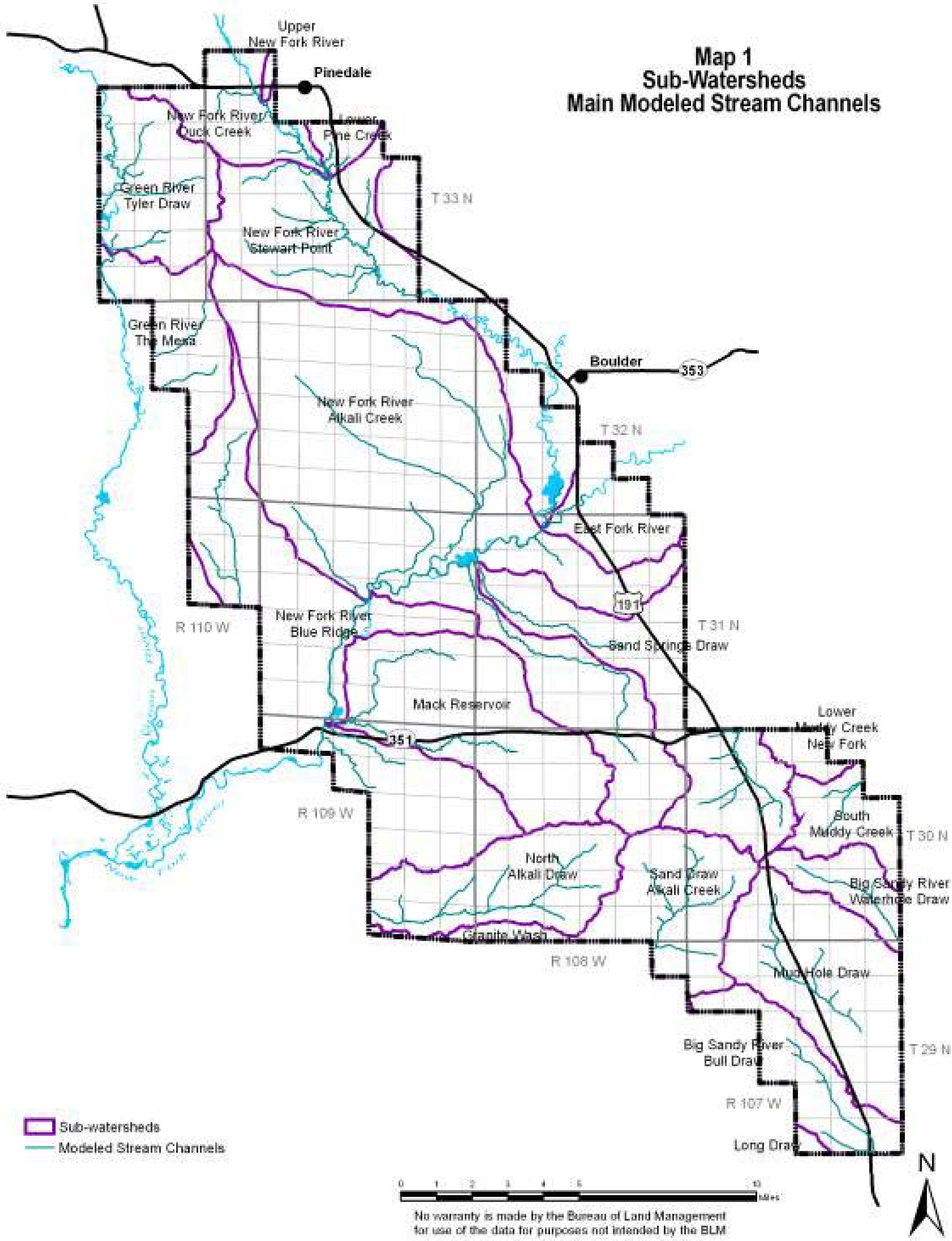
- No Disturbance in the PAPA (baseline conditions)
- Current Conditions (end of 2006)
- No Action Alternative (end of 2011)
- Proposed Action Alternative (end of 2011 and 2023)
- Alternative C (end of 2011 and 2023)

Baseline conditions are based on the vegetation / land cover described in the Wyoming Land Cover Gap Analysis (Wyoming Gap Analysis, 1996) and PAPA-specific vegetation data. Current Conditions and Alternatives were modeled by adding disturbances to the 1996 vegetation. The exact locations of the disturbances are not yet determined, but disturbance percentages per quarter section were given. The total amount of disturbance is the same for the Proposed Action Alternative and Alternative C, but the distribution and development time lines differ. Mitigation measures such as engineered retention structures would likely be implemented, but the mitigation effects were not modeled; therefore, the model results are considered conservative.

2 WATERSHEDS AND SOILS

2.1 Watershed Hydrology

Five perennial streams flow partially through the PAPA: Duck Creek, East Fork River, Green River, New Fork River, and Pine Creek. The majority of the PAPA is drained by intermittent and ephemeral drainages. The PAPA is within the Upper Colorado Region and the Upper Green River Basin and is divided into three sub-basins: Upper Green River, New Fork River, and Big Sandy River. Twenty-one sub-watersheds intersect the PAPA. Of these, twelve drain into the New Fork River, which then flows into the Green River. Five sub-watersheds drain either directly into the Green River, or into the Green River via Alkali Creek. Four sub-watersheds drain into the Big Sandy River (Table 1 and Map 1).



Map 1
Sub-Watersheds
Main Modeled Stream Channels
Upper New Fork River
Pinedale
New Fork River Duck Creek
Lower Pine Creek
Green River Tyler Draw
T 33 N
New Fork River Stewart Point
Green River The Mesa
Boulder
353
New Fork River Alkali Creek
T 32 N
East Fork River
191
T 31 N
R 110 W
New Fork River Blue Ridge
Sand Springs Draw
Mack Reservoir
351
Lower Muddy Creek New Fork
R 109 W
South Muddy Creek
T 30 N
North Alkali Draw
Sand Draw Alkali Creek
Big Sandy River Waterhole Draw
Granite Wash
R 108 W
Mud Hole Draw
Big Sandy River Bull Draw
T 29 N
R 107 W
Long Draw
Sub-watersheds
Modeled Stream Channels
0 1 2 3 4 5 10 Miles
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Table 1 Watershed Areas

Sub-Watershed	Sub-Basin	Hydrologic Unit Code (HUC)	Surface Area (acres) in PAPA	Total Surface Area (acres)
Big Sandy River – Bull Draw	Big Sandy River	140401040106	5,761	19,768
Big Sandy River - Long Draw	Big Sandy River	140401040109	316	18,529
Big Sandy River – Waterhole Draw	Big Sandy River	140401040105	3,349	23,876
Mud Hole Draw	Big Sandy River	140401040107	12,923	19,619
East Fork River	New Fork	140401020302	4,885	25,005
Hay Gulch	New Fork	140401020105	245	14,668
Lower Muddy Creek – New Fork	New Fork	140401020603	1,492	34,520
Lower Pine Creek	New Fork	140401020203	1,276	25,749
Lower Pole Creek	New Fork	140401020403	1,757	20,119
Mack Reservoir	New Fork	140401020306	15,353	15,353
New Fork River – Alkali Creek	New Fork	140401020303	49,522	49,532
New Fork River – Blue Ridge	New Fork	140401020305	24,909	39,853
New Fork River – Duck Creek	New Fork	140401020102	5,521	37,229
New Fork River – Stewart Point	New Fork	140401020301	17,216	32,670
Sand Springs Draw	New Fork	140401020304	13,207	19,073
South Muddy Creek	New Fork	140401020602	4,121	33,923
Granite Wash	Upper Green River	140401010704	1,091	12,218
Green River – The Mesa	Upper Green River	140401010404	7,293	41,713
Green River –Tyler Draw	Upper Green River	140401010403	8,834	34,761
North Alkali Draw	Upper Green River	140401010705	9,959	15,918
Sand Draw – Alkali Creek	Upper Green River	140401010701	9,004	22,941

2.2 Erosion, Sediment Transport, and Salt Loading

Soils within the PAPA vary in physical and chemical characteristics as determined primarily by geologic, topographic, and climatic factors. Soils on steeper slopes are especially subject to water erosion and are difficult to reclaim (BLM, 1983). Project activities may increase the potential erosion of these soils, due to the proposed surface disturbance. After major storm events, disturbed soils could be eroded and transported into live streams, if unchecked by appropriate erosion control measures (e.g., reclamation, retention structures).

Increased erosion and sediment transport could lead to increased salinity in the Green River and significant precipitation events could move the dissolved salt to these receiving waters. Salt loading is an issue of concern in the Colorado/Green River system; therefore, any salt loading associated with this project could have implications concerning the Colorado River Basin Salinity Control Act (USBR, 1974).

3 MODEL SETUP

3.1 SWAT and KINEROS2

The watershed modeling was performed using the physically based models SWAT and KINEROS2.

KINEROS2 is an event oriented model, i.e. it is meant to model single storm events. It describes the processes of interception, infiltration, surface runoff, and erosion from small agricultural and urban watersheds during a storm event. Watersheds are represented by a cascade of planes and channels. The partial differential equations describing overland flow, channel flow, erosion, and sediment transport are solved by finite difference techniques. The spatial variations of rainfall, infiltration, runoff, and erosion parameters can be accommodated within the program. KINEROS2 may be used to determine the effects of various artificial features--such as urban developments, small detention reservoirs, or lined channels--on flood hydrographs and sediment yield.

The KINEROS2 model was operated using a public-domain GIS interface, called Automated Geospatial Watershed Assessment or AGWA. AGWA was developed by the USDA, Agricultural Research Service, Southwest Watershed Research Center, in cooperation with the U.S. Environmental Protection Agency (EPA) Office of Research and Development (Burns et al. 2004). AGWA operates in ArcView 3.x GIS and was used to perform the automated parameterization of KINEROS2 for a specified watershed.

SWAT is a continuous time model, i.e. a long-term sediment yield model. The model is not designed to simulate detailed, single-event flood routing. For modeling purposes, a watershed may be partitioned into a number of sub-watersheds or sub-basins. The use of sub-basins in a simulation is particularly beneficial when different areas of the watershed are dominated by land uses or soils dissimilar enough in properties to impact hydrology (Neitsch et al. 2002). SWAT was also operated using AGWA.

3.2 Precipitation and Storm Events

For the two different models, two different types of precipitation data had to be used. SWAT required daily rainfall data for a long period of time, while KINEROS2 required total rainfall depth for a discrete storm event.

Precipitation used for the SWAT input was the daily rainfall data from the gage at Pinedale, Wyoming for the 25- year time period 1980 through 2004. Missing data were filled in with data from the gage at the Boulder Rearing Station (NOAA, 2006). Rainfall was assumed to be uniformly distributed over the entire PAPA. Model runs for SWAT were conducted for the complete 25 year period; the results are then averaged by the model to give the average annual erosion data.

Storm runoff events for KINEROS2 were modeled for 24-hour storms having the following recurrence intervals:

- 5-year
- 10-year
- 20-year
- 50-year
- 100-year, and
- 150-year

Precipitation depths for the 2-year through 100-year storm events were obtained from the National Oceanic and Atmospheric Administration (NOAA) Atlas for Western Precipitation Frequency Maps (NOAA 1973). The precipitation depth for the 150-year storm event was extrapolated from the NOAA data using a semi-log plot (Figure 1). Precipitation depths for all storm events are summarized in Table 2.

Figure 1. Storm Magnitude

Table 2 Recurrence Interval and Magnitude of 24-hour Precipitation Event

Recurrence Interval T (Years)	Annual Probability	Storm Magnitude x_T (inches)
2	0.5	1.0
5	0.2	1.4
10	0.1	1.6
20	0.04	2.0
50	0.02	2.3
100	0.01	2.6
150	0.0067	2.7

Using AGWA, the precipitation depth is converted to a hyetograph using the Soil Conservation Service (SCS) methodology (SCS 1973) and a type II storm distribution. The precipitation input files for KINEROS2 give the rainfall depth over time, and a sample is shown in Attachment A.

3.3 Elevation Data and Watershed Delineation

The SWAT and KINEROS2 models both calculate flow and erosion in a watershed by assuming each watershed is a connected series of planes and channels. AGWA calculates the planes and channels necessary for input from digital elevation data. Elevation data from the National Elevation Dataset were downloaded from the U.S. Geological Survey (USGS) EROS Data Center (USGS 2005).

The following elevation data were used: National Elevation Dataset (NED) 1/3 Arc Second, downloaded in ArcGrid NAD 83 Geographic format (vertical datum is GRS 80. For this dataset, the resolution is 10 m. The elevation data were converted to NAD 1983, UTM Zone 12, in meters.

AGWA was then used to delineate the watersheds covering the PAPA and to divide the watersheds into planes and channels for KINEROS2 and SWAT input. This process is described in the AGWA manual (Burns et al. 2004). First, any sinks in the NED data are filled. Sinks are isolated depressions in the elevation surface that can cause flow routing problems. Next, a flow direction grid is created for the entire topographic surface. Then a flow accumulation grid is created. The user then selects a watershed outlet, and the watershed is delineated according to the elevations in the NED file. Ponds or internal gages can be created, but were not used for this project. Lastly, a size for the contributing source area (CSA) of 2.5% or 350 acres, whichever was larger, of the watershed size was selected for all watersheds. CSA is the area that is required before the flow becomes channelized. Smaller numbers result in a larger number of smaller planes and vice versa, so the CSA is a measure of the geometric complexity at which the watershed is delineated. The sub-watershed channels created for input are shown on Map 1.

Discrete channels were created within AGWA, and AGWA-created model channels were generally consistent with the mapped drainage channels. Channel geometry was defined by using the model-default hydraulic geometry relationship options for the channel geometries. These relationships are known as bankfull hydraulic geometry relationships, and they define the bankfull channel width and depth based on watershed size. Bankfull hydraulic geometry relationships are useful in that they define channel topography with minimal input from the user and when actual channel topography is not known or known only for a small portion of actual channels in the watershed (Burns et al. 2004).

3.4 Soils

Properties of the soils in the watersheds can provide estimated input parameters, such as infiltration, water flow, and sediment routing for KINEROS2 and SWAT. The following parameters are estimated for each channel and plane element of each watershed from the soil properties:

Both Models:

- Ks - saturated hydraulic conductivity, in mm/hr

KINEROS2 Parameters:

- CV - Coefficient of variation of Ks
- G - mean capillary drive, in mm (a zero value sets the infiltration rate to a constant value of Ks)
- Distribution - pore size distribution index (or Brooks and Corey Lambda) (This is a parameter used for redistribution of soil moisture during intervals of no flow.)
- Porosity
- Rock - volumetric rock fraction, if any
- Splash - rain splash coefficient (for plane elements only) (0-1)
- Cohesion - cohesion coefficient of bed material, and
- Fractions - list of particle class fractions that must sum to one. Fract_sand: fractional sand content (0-1) ; Fract_silt: fractional silt content (0-1); Fract_clay: fractional clay content (0-1).

SWAT Parameters:

- HydValue - weighted hydrologic group value used to determine the runoff curve number.
- CN - area-weighted runoff curve number based on soil type and land cover

For KINEROS2, the soil parameters are area-weighted by sub-watershed. For SWAT, these values are based on the dominant soil type found in the sub-watershed.

AGWA estimates these parameters from the State Soil Geographic (Statsgo) database (Burns et al., 2004). However, more detailed soil data are available for the PAPA from the Burma Road Soil Survey (ERO Resources Corporation, 1988) and an on-going survey (Vasquez, 2006). Detailed soil data from both reports were used within the PAPA. The extent of each soil survey within the PAPA is shown in Map 2. The data was put in a database format equivalent to the Statsgo data format. Statsgo soils data were added to the new database for areas where other information was not available. The Statsgo data for Wyoming were downloaded from the NRCS website (NRCS 2005). The database tables created from the Burma Road Soil Survey and the new NRCS survey for the PAPA and surrounding Statsgo soils are shown in Attachment B. The newly created database tables were then used within AGWA to estimate the parameters listed above. The range and average of the parameters estimated from the soils data are shown in Table 3 for KINEROS2 and in Table 4 for SWAT.

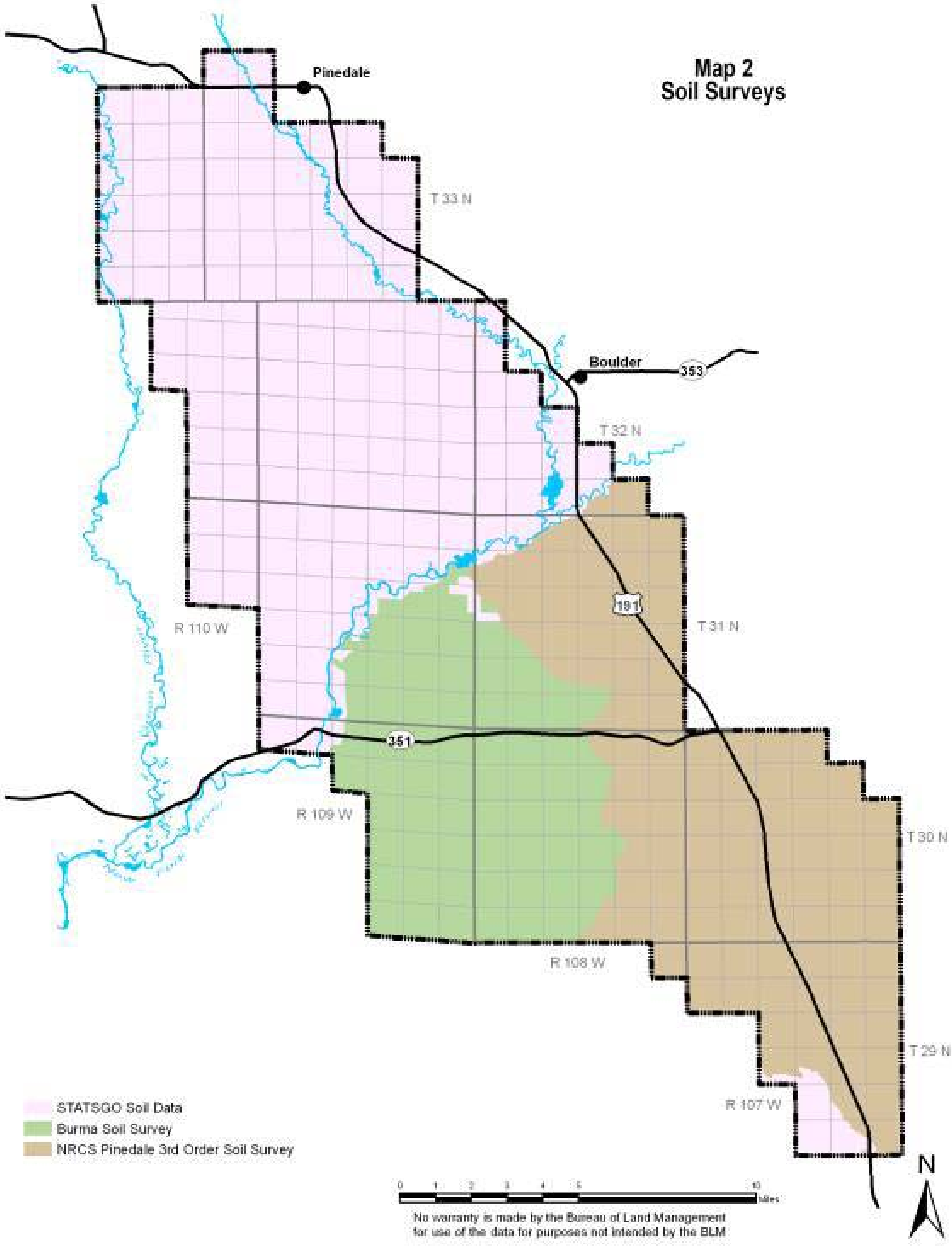
Map 2
Soil Surveys
Pinedale
Boulder
353
191
351
T 33 N
T 32 N
T 31 N
T 30 N
T 29 N
R 110 W
R 109 W
R 108 W
R 107 W
STATSGO Soil Data
Burma Soil Survey
NRCS Pinedale 3rd Order Soil Survey
N
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Table 3 KINEROS2 Input Parameters Derived from Soil Properties

	Channel (Constant-AGWA default values)	**Plane Average**	**Plane Minimum**	**Plane Maximum**
Ks (mm/hr)	210	14.84	3.26	36.79
CV	0	1.06	0.53	1.54
G (mm)	101	182.52	88.77	280.98
Distribution	0.545	0.29	0.22	0.32
Porosity	0.44	0.428	0.331	0.465
Rock	0	0.15	0.05	0.48
Splash	--	106.65	73.30	134.40
Cohesion	0.005	0.006	0.004	0.008
Sand Fraction	0.9	0.51	0.37	0.69
Silt Fraction	0.05	0.27	0.15	0.40
Clay Fraction	0.05	0.22	0.12	0.34

Table 4 SWAT Input Parameters Derived from Soil Properties

	Average	**Minimum**	**Maximum**
Ks (mm/hr)	23.90	12.01	41.58
HydValue	1.32	0.98	2.26

3.5 Land Cover

Land cover and vegetation can be used to estimate infiltration parameters and the Manning roughness for KINEROS2 and SWAT. The following parameters have to be estimated for each plane element of each watershed for KINEROS2:

Both Models:

- Manning - Manning roughness coefficient (for plane and channel elements)

KINEROS2 Parameters:

- Canopy - fraction of surface covered by intercepting cover (rainfall intensity is reduced by this fraction until the specified interception depth has accumulated)
- Interception - interception depth in mm or inches, and

SWAT Parameters:

- CN: area-weighted runoff curve number based on soil type and land cover
- Cover: fraction of surface covered by intercepting cover – rainfall intensity is reduced by this fraction until the specified interception depth has been accumulated (0-1)

AGWA can estimate these parameters from the Multi-Resolution Land Characteristics (MRLC) Consortium National Land Cover Data (NLCD).

Two sources were used to obtain the land cover data. For the PAPA, detailed specific vegetation data were developed as grid files. Outside the PAPA, Wyoming GAP land cover data from a map at 1:100,000-scale (http://www.sdvc.uwyo.edu/clearinghouse/metadata/landcov.html) were added to the map. Vegetation types were converted to the closest land cover type defined in the NLCD land cover database. The resulting land cover classification is shown in Map 3. In order to use the AGWA parameter estimation routine, an ID was assigned to each vegetation type according to the NLCD land cover class. Thus, the AGWA lookup table could be used to convert land cover information to modeling parameters. The AGWA look-up table for vegetation data is shown in Attachment C.

The ranges and average of the parameters estimated from land cover data for KINEROS2 are shown in Table 5, and for SWAT in Table 6.

Table 5 KINEROS2 Input Parameters Derived from Land Cover Properties

	Channel (Constant)	**Plane Average**	**Plane Minimum**	**Plane Maximum**
Canopy (no disturbance case)	--	0.31	0.10	0.70
Interception (no disturbance case)	--	2.54	0.72	3.00
Manning (no disturbance case)	0.035	0.053	0.025	0.104
Canopy (disturbance cases)	--	0.25	0.07	0.70
Interception (disturbance cases)	--	1.98	0.23	3.00
Manning (disturbance cases)	0.035	0.044	0.004	0.158

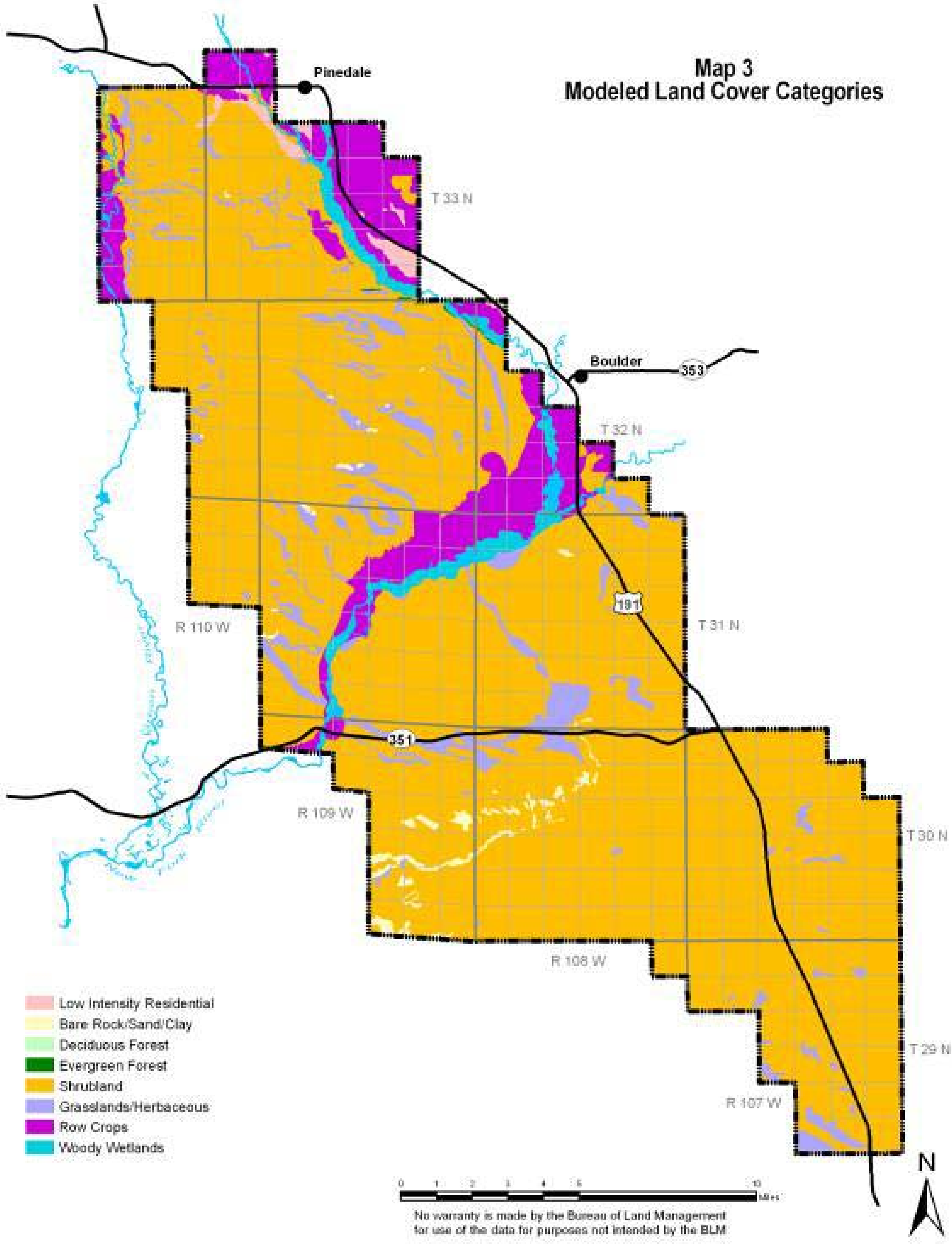
Map 3
Modeled Land Cover Categories
Pinedale
Boulder
353
T 33 N
T 32 N
T 31 N
T 30 N
T 29 N
191
351
R 110 W
R 109 W
R 108 W
R 107 W
Low Intensity Residential
Bare Rock/Sand/Clay
Deciduous Forest
Evergreen Forest
Shrubland
Grasslands/Herbaceous
Row Crops
Woody Wetlands
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Table 6 SWAT Input Parameters Derived from Land Cover Properties

	Channel (Constant)	Plane Average	Plane Minimum	Plane Maximum
CN (no disturbance case)	--	86.43	81.12	91.23
Cover (no disturbance case)	--	28.78	20.60	63.80
Manning (no disturbance case)	0.030	0.050	0.050	0.050
CN (disturbance cases)	--	87.77	81.12	94.00
Cover (disturbance cases)	--	25.32	6.93	61.00
Manning (disturbance cases)	0.030	0.050	0.050	0.050

3.6 Disturbance

Disturbances from PAPA developments were simulated for modeling purposes by assuming the land cover changes to equal bare ground, a conservative assumption. Disturbance percentages were given by quarter section for each of the modeled alternatives. The disturbance percentages for each modeled scenario are given in Attachment D. Land cover parameters for each quarter section were changed to simulate the appropriate percentage of disturbance.

3.7 Salt Loading

In the Burma Road Soil Survey (ERO Resources Corporation 1988), chemical analyses of seven soil profiles were performed. The chemical properties of the top layer of saturated soil are summarized in Table 7. The median measured electric conductivity for the 1988 analyzed profiles using the saturated paste method is 0.4 dS/m.

Table 7 Soil Profile Chemical Analysis (ERO Resources Corporation 1988)

Soil Name	Depth (inches)	Electric Conductivity (dS/m)	Ca (meq/l)	Mg (meq/l)	Na (meq/l)	Sodium Adsorption Ratio
Fraddle	0-4	0.3	1.4	0.7	0.3	0.3
Quard Variant	0-4	0.5	1.2	0.7	3.2	3.3
Dines	0-4	0.4	1.0	0.4	3.0	3.5
Fluvent, Saline-Sodic	0-4	2.5	4.3	1.1	22.4	13.6
Vermillion Variant	0-3	0.3	1.4	1.1	0.3	0.3
Baston	0-3	0.5	0.8	0.5	4.7	6.0
Langspring Variant	0-3	0.4	4.4	1.1	0.3	0.2

Electric conductivity was measured with the saturation extract method or saturated paste method. In this method, water is added to the soil until the soil is saturated and just reaches the flow point. This condition is referred to as a saturated paste. The saturated paste is allowed to sit for approximately two hours to reach equilibrium. At that time, the water present in the paste is extracted. This extract is referred to as the saturation extract. The electrical conductivity of this extract is then measured. The higher the salt concentration in a specific soil, the higher the conductivity of the saturation extract.

In ERO Resources Corporation (1988), an estimated electric conductivity is given for all soils in the study area for this report (see also BLM 2005). The estimated average electric conductivity for each soil series and the derived electric conductivity for each soil complex or map unit are shown in Attachment E.

The estimated electric conductivities are given as a range or maximum. The estimated electric conductivity for all watersheds within the PAPA and covered by the Burma Soil Survey is less than 2 dS/m.

The NRCS Pinedale Third Order Soil Survey (Vazquez, 2006) also provides estimates for electric conductivity for all soil types. With the exception of the Havermom-Tismid-Giarch complex, all soils are considered non-saline, with an electric conductivity less than 2 dS/m. In the Havermom-Tismid-Giarch complex salinity ranges from 8 – 32 dS/m for the top nine inches of Havermon, from 0 to 16 dS/m for the top nine inches of Tismid, and 2 – 25 dS/m for the top nine inches of eroded Girarch. This complex is found in a narrow band along Sand Spring Draw.

Electric conductivity, which is closely related to total dissolved solids (TDS), can be used as a general measure of salinity. A commonly used conversion states that the TDS in mg/L is roughly equal to 0.67 times the electric conductivity in µS/cm (Hem, 1989); thus, the average salinity as expressed in TDS for soil water extract is about 268 mg/L for the measured profile average and a maximum of 1,340 mg/L for the estimated salinity range.

4 MODEL RESULTS

Two separate models were used to estimate the average annual erosion in the PAPA, and the sediment transport in channels during storm events. SWAT was used to estimate average annual erosion, and KINEROS2 was used to estimate sediment transport to the PAPA boundary and to the New Fork River within the PAPA.

The same seven scenarios described above were modeled: No Disturbance (Baseline Conditions), Current Conditions (end of 2006), the No-Action Alternative through 2011, Proposed Action Alternative through 2011 and 2023, and Alternative C through 2011 and 2023. For all development scenarios it was assumed that no erosion or sediment control measures would be in place, a conservative assumption.

Of the seven scenarios modeled it was found that the Proposed Action Alternative and Alternative C would cause equal amounts of erosion and sediment loss, both in 2011 and 2023. Thus, even though both of these Alternatives were modeled individually, the discussion of the results from those two alternatives was combined in the following sections.

4.1 Average Annual Erosion (Sediment Loss)

Water-caused erosion (sediment loss) in the PAPA was modeled for 15 of the 21 sub-watersheds intersecting the PAPA. The sub-watersheds modeled were Lower Pine Creek, New Fork River –Duck Creek, New Fork River – Stewart Point, New Fork River – Alkali Creek, East Fork River, Sand Springs Draw, Mack Reservoir, New Fork River – Blue Ridge, Green River –Tyler Draw, Green River – The Mesa, North Alkali Draw, Sand Draw – Alkali Creek, Big Sandy River – Waterhole Draw, Mud Hole Draw, and Big Sandy River – Bull Draw. Of the remaining six watersheds, five, Hay Gulch, Lower Pole Creek, Lower Muddy Creek – New Fork, Long Draw, and Granite Wash, had areas inside the PAPA that were too small to model. South Muddy Creek has a slightly larger area inside the PAPA, but does not contain any disturbance under any of the scenarios, and thus was also excluded from modeling.

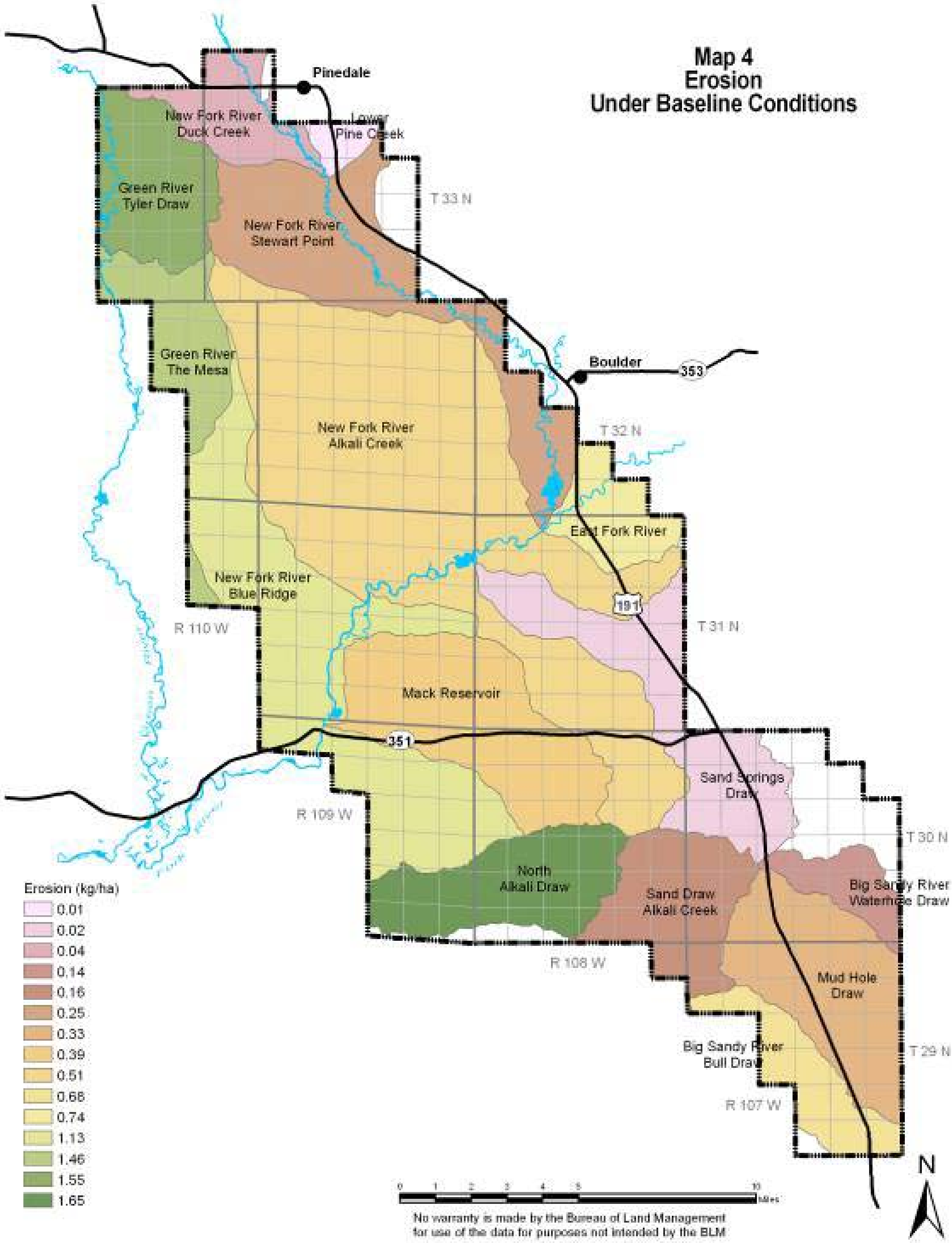
Water-caused erosion is generally low in the PAPA due to low average annual precipitation and low angle slopes. The baseline average sediment loss ranges from less than 0.02 kg/hectare on low angle slopes to approximately 1.5 kg/hectare per year on steeper slopes in the PAPA. A summary of the modeled average annual sediment loss for the 15 sub-watersheds in the PAPA area for baseline conditions and the modeled alternatives is presented in Table 8 and Maps 4, and 5A, 6A, 7A, and 8A. The percent increase in sediment loss compared to baseline conditions is given in Table 9 and Maps 5B, 6B, 7B, and 8B. The percent increase in sediment loss compared to current conditions is given in Table 10

Table 8. Average Annual Sediment Loss.

Sub-watershed	Sediment Loss (kg/ha)				
	Baseline (Map 4)	**Current Conditions (2006) (Map 5A)**	**No Action Alternative (2011) (Map 6A))**	**Proposed Action Alternative and Alternative C (2011) (Map 7A)**	**Proposed Action Alternative and Alternative C (2023) (Map 8A)**
Big Sandy River - Bull Draw	0.68	0.70	0.70	0.70	0.70
Big Sandy River - Waterhole Draw	0.14	0.15	0.15	0.15	0.15
East Fork River	0.74	0.74	0.74	0.74	0.74
Green River - The Mesa	1.46	1.46	1.46	1.46	1.46
Green River - Tyler Draw	1.55	1.55	1.57	1.57	1.57
Lower Pine Creek	0.01	0.01	0.01	0.01	0.01
Mack Reservoir	0.39	0.44	0.71	0.56	0.89
Mud Hole Draw	0.33	0.39	0.40	0.41	0.41
New Fork River - Alkali Creek	0.51	0.67	0.95	0.99	1.16
New Fork River - Blue Ridge	1.13	1.13	1.16	1.14	1.28
New Fork River - Duck Creek	0.04	0.04	0.04	0.04	0.04
New Fork River - Stewart Point	0.25	0.33	0.35	0.34	0.47
North Alkali Draw	1.65	2.05	2.49	2.62	2.70
Sand Draw - Alkali Creek	0.16	0.19	0.21	0.20	0.24
Sand Springs Draw	0.02	0.02	0.02	0.02	0.02
PAPA Average	**0.60**	**0.66**	**0.73**	**0.73**	**0.79**

Table 9. Average Annual Sediment Loss Increase above Baseline Conditions.

Sub-watershed	**Sediment Loss Increase over Baseline Conditions**			
	Current Conditions (2006) (Map 5B)	**No Action Alternative (2011) (Map 6B)**	**Proposed Action Alternative and Alternative C (2011) (Map 7B)**	**Proposed Action Alternative and Alternative C (2023) (Map 8B)**
Big Sandy River - Bull Draw	3%	3%	3%	3%
Big Sandy River - Waterhole Draw	8%	8%	8%	8%
East Fork River	0%	0%	0%	0%
Green River - The Mesa	0%	0%	0%	0%
Green River - Tyler Draw	0%	1%	1%	1%
Lower Pine Creek	0%	0%	0%	0%
Mack Reservoir	13%	83%	44%	130%
Mud Hole Draw	17%	20%	23%	24%
New Fork River - Alkali Creek	32%	87%	96%	128%
New Fork River - Blue Ridge	1%	3%	1%	14%
New Fork River - Duck Creek	0%	0%	0%	0%
New Fork River - Stewart Point	33%	40%	37%	87%
North Alkali Draw	24%	51%	59%	64%
Sand Draw - Alkali Creek	17%	28%	25%	51%
Sand Springs Draw	0%	0%	0%	0%
PAPA Average	**9%**	**21%**	**21%**	**31%**


Map 4
Erosion
Under Baseline Conditions
Pinedale
Boulder
New Fork River Duck Creek
Lower Pine Creek
Green River Tyler Draw
New Fork River Stewart Point
Green River The Mesa
New Fork River Alkali Creek
East Fork River
New Fork River Blue Ridge
Mack Reservoir
Sand Springs Draw
North Alkali Draw
Sand Draw Alkali Creek
Big Sandy River Waterhole Draw
Mud Hole Draw
Big Sandy River Bull Draw
T 33 N
T 32 N
T 31 N
T 30 N
T 29 N
R 110 W
R 109 W
R 108 W
R 107 W
353
191
351
Erosion (kg/ha)
0.01
0.02
0.04
0.14
0.16
0.25
0.33
0.39
0.51
0.66
0.74
1.13
1.46
1.55
1.65
N
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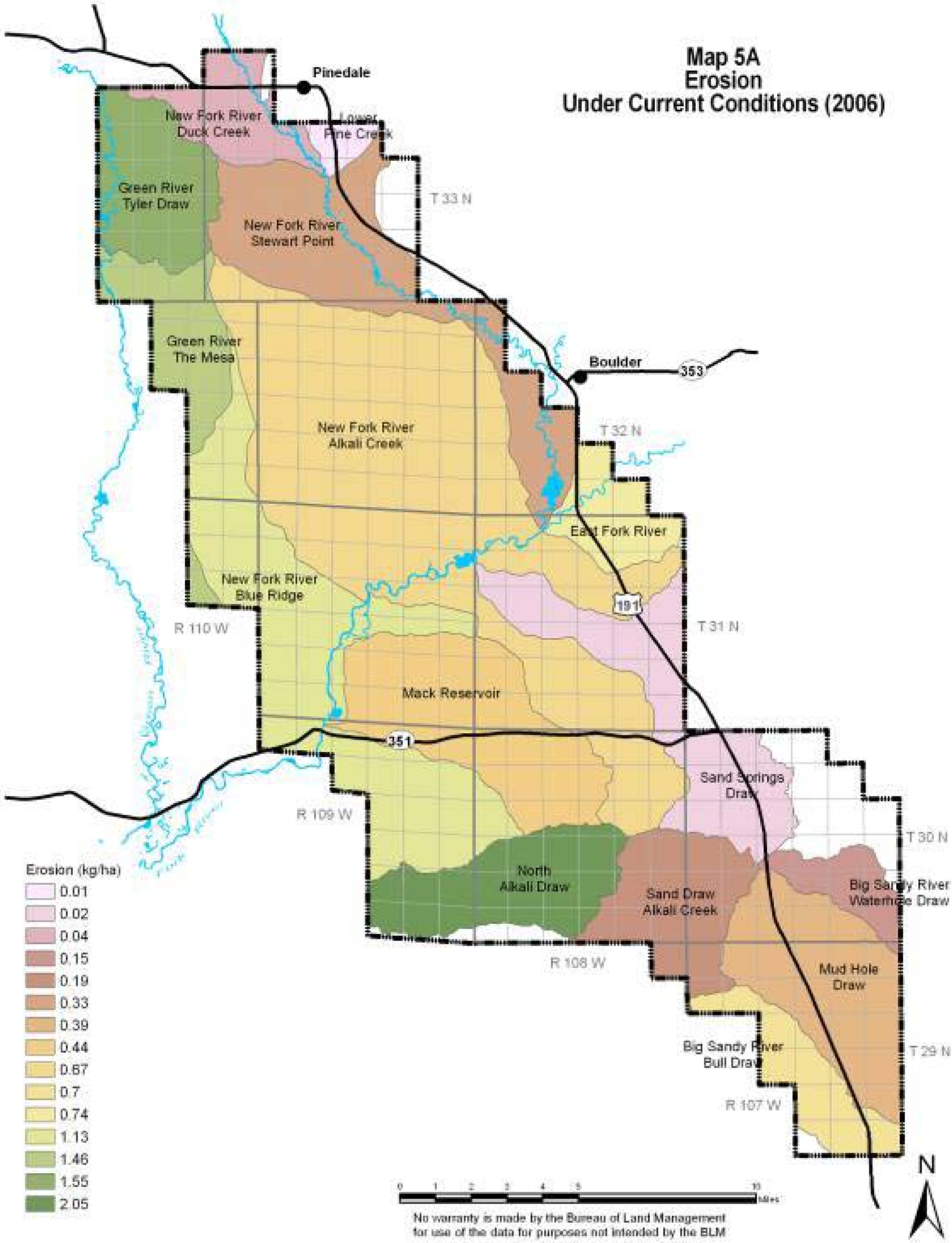
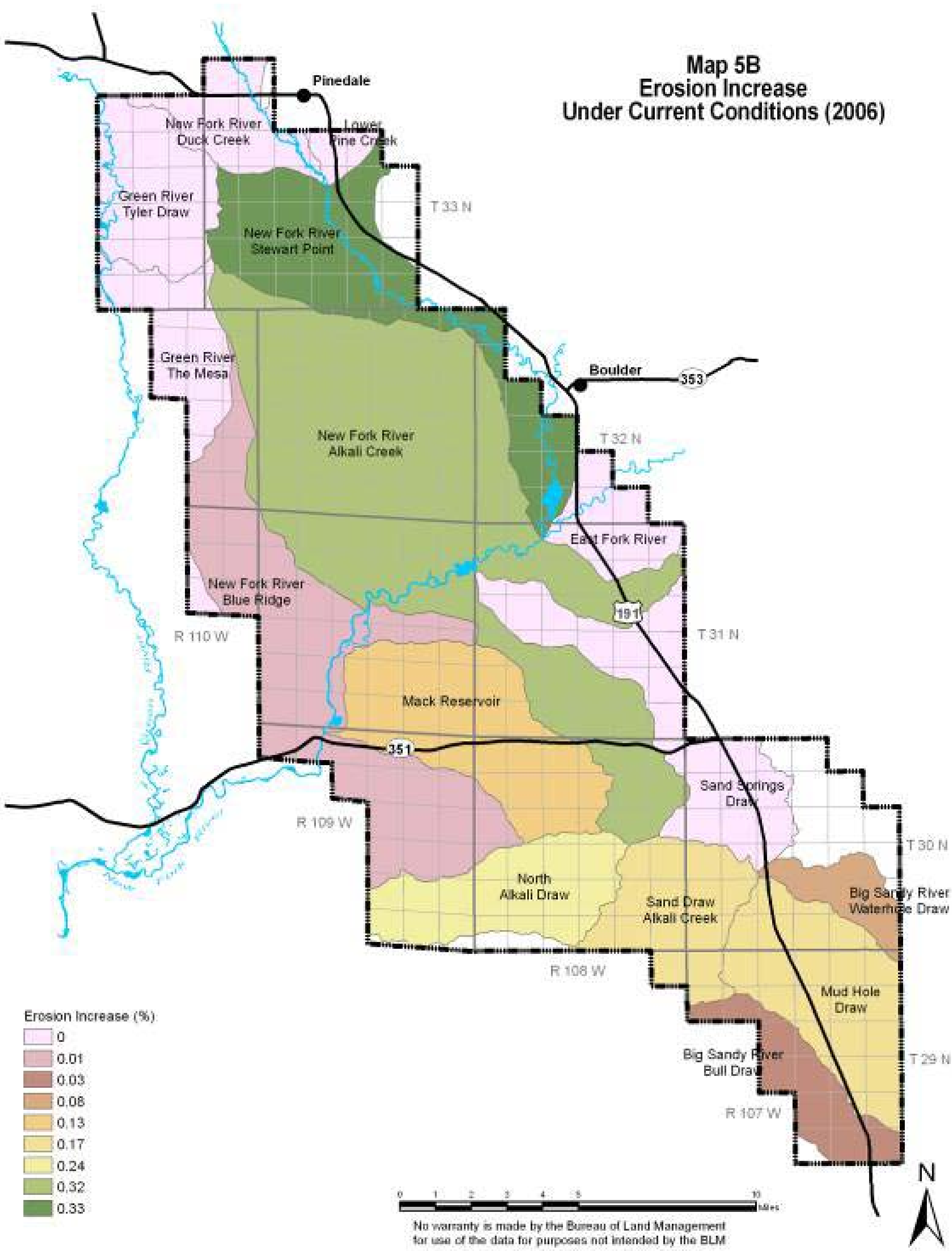
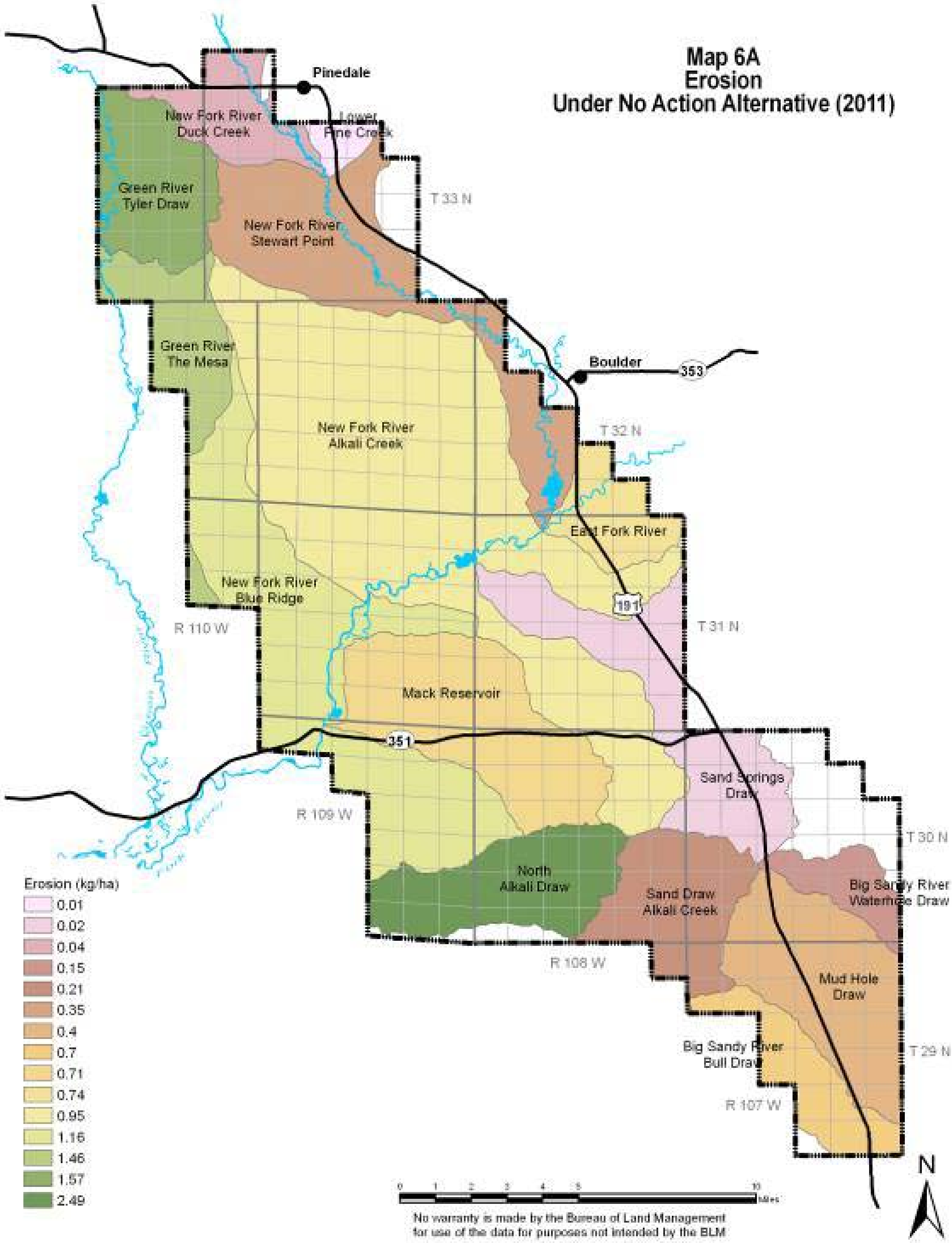
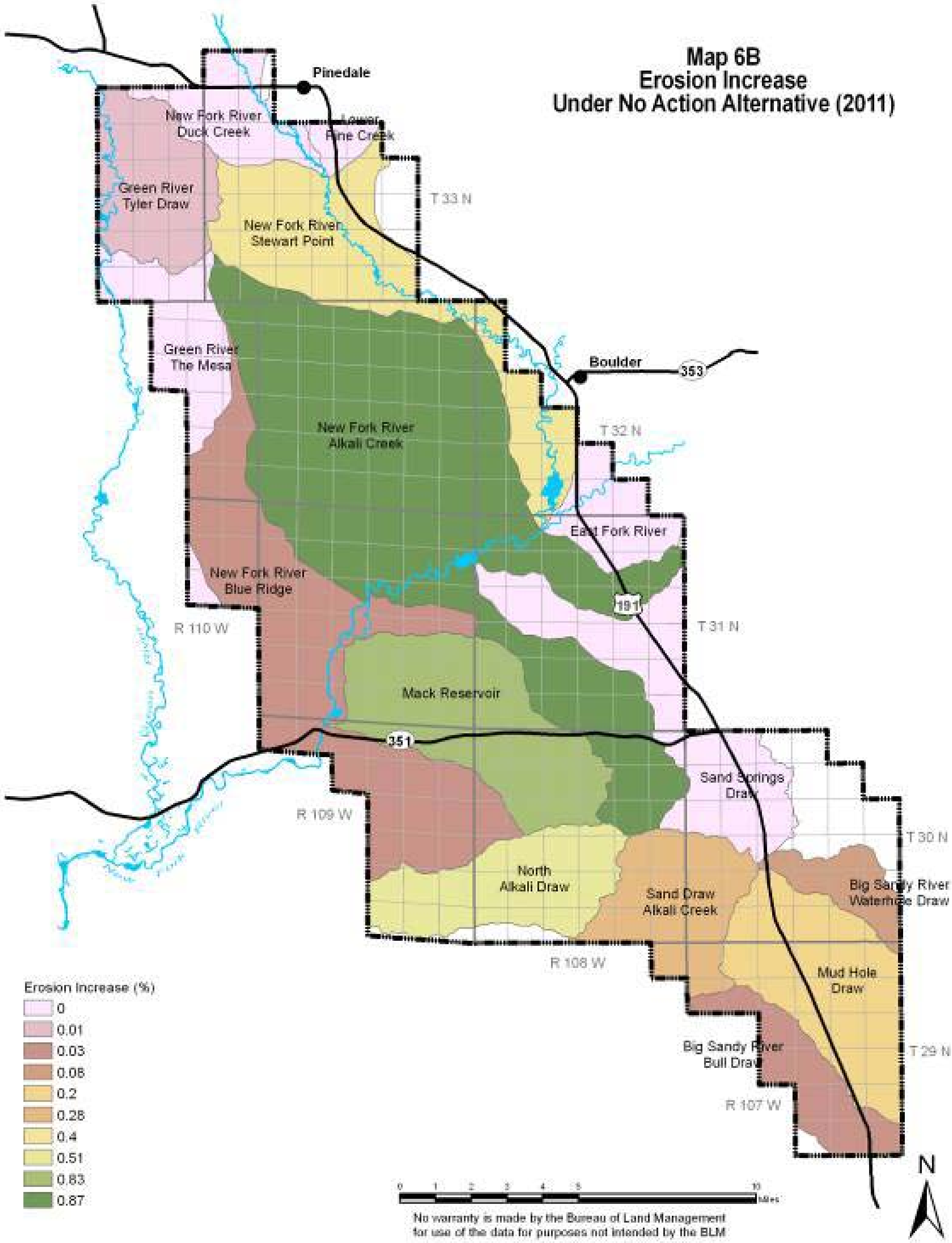

Map 5A
Erosion
Under Current Conditions (2006)
Pinedale
Boulder
New Fork River Duck Creek
Lower Pine Creek
Green River Tyler Draw
New Fork River Stewart Point
Green River The Mesa
New Fork River Alkali Creek
East Fork River
New Fork River Blue Ridge
Mack Reservoir
Sand Springs Draw
North Alkali Draw
Sand Draw Alkali Creek
Big Sandy River Waterhole Draw
Mud Hole Draw
Big Sandy River Bull Draw
T 33 N
T 32 N
T 31 N
T 30 N
T 29 N
R 110 W
R 109 W
R 108 W
R 107 W
353
191
351
Erosion (kg/ha)
0.01
0.02
0.04
0.15
0.19
0.33
0.39
0.44
0.67
0.7
0.74
1.13
1.46
1.55
2.05
Miles
No warranty is made by the Bureau of Land Management for use of the data for purposes not intended by the BLM
N


Map 5B
Erosion Increase
Under Current Conditions (2006)
Pinedale
Boulder
353
191
351
New Fork River Duck Creek
Lower Pine Creek
Green River Tyler Draw
New Fork River Stewart Point
Green River The Mesa
New Fork River Alkali Creek
East Fork River
New Fork River Blue Ridge
Mack Reservoir
Sand Springs Draw
North Alkali Draw
Sand Draw Alkali Creek
Big Sandy River Waterhole Draw
Mud Hole Draw
Big Sandy River Bull Draw
T 33 N
T 32 N
T 31 N
T 30 N
T 29 N
R 110 W
R 109 W
R 108 W
R 107 W
Erosion Increase (%)
0
0.01
0.03
0.08
0.13
0.17
0.24
0.32
0.33
N
No warranty is made by the Bureau of Land Management for use of the data for purposes not intended by the BLM


Map 6A
Erosion
Under No Action Alternative (2011)
Pinedale
Boulder
353
191
351
New Fork River Duck Creek
Lower Pine Creek
Green River Tyler Draw
New Fork River Stewart Point
Green River The Mesa
New Fork River Alkali Creek
East Fork River
New Fork River Blue Ridge
Mack Reservoir
Sand Springs Draw
North Alkali Draw
Sand Draw Alkali Creek
Big Sandy River Waterhole Draw
Mud Hole Draw
Big Sandy River Bull Draw
T 33 N
T 32 N
T 31 N
T 30 N
T 29 N
R 110 W
R 109 W
R 108 W
R 107 W
Erosion (kg/ha)
0.01
0.02
0.04
0.15
0.21
0.35
0.4
0.7
0.71
0.74
0.95
1.16
1.46
1.57
2.49
0 1 2 3 4 5 10 Miles
No warranty is made by the Bureau of Land Management for use of the data for purposes not intended by the BLM
N


Map 6B
Erosion Increase
Under No Action Alternative (2011)
Pinedale
Boulder
New Fork River
Duck Creek
Lower
Pine Creek
Green River
Tyler Draw
New Fork River
Stewart Point
Green River
The Mesa
New Fork River
Alkali Creek
East Fork River
New Fork River
Blue Ridge
Mack Reservoir
Sand Springs
Draw
North
Alkali Draw
Sand Draw
Alkali Creek
Big Sandy River
Waterhole Draw
Mud Hole
Draw
Big Sandy River
Bull Draw
T 33 N
T 32 N
T 31 N
T 30 N
T 29 N
R 110 W
R 109 W
R 108 W
R 107 W
353
191
351
Erosion Increase (%)
0
0.01
0.03
0.08
0.2
0.28
0.4
0.51
0.83
0.87
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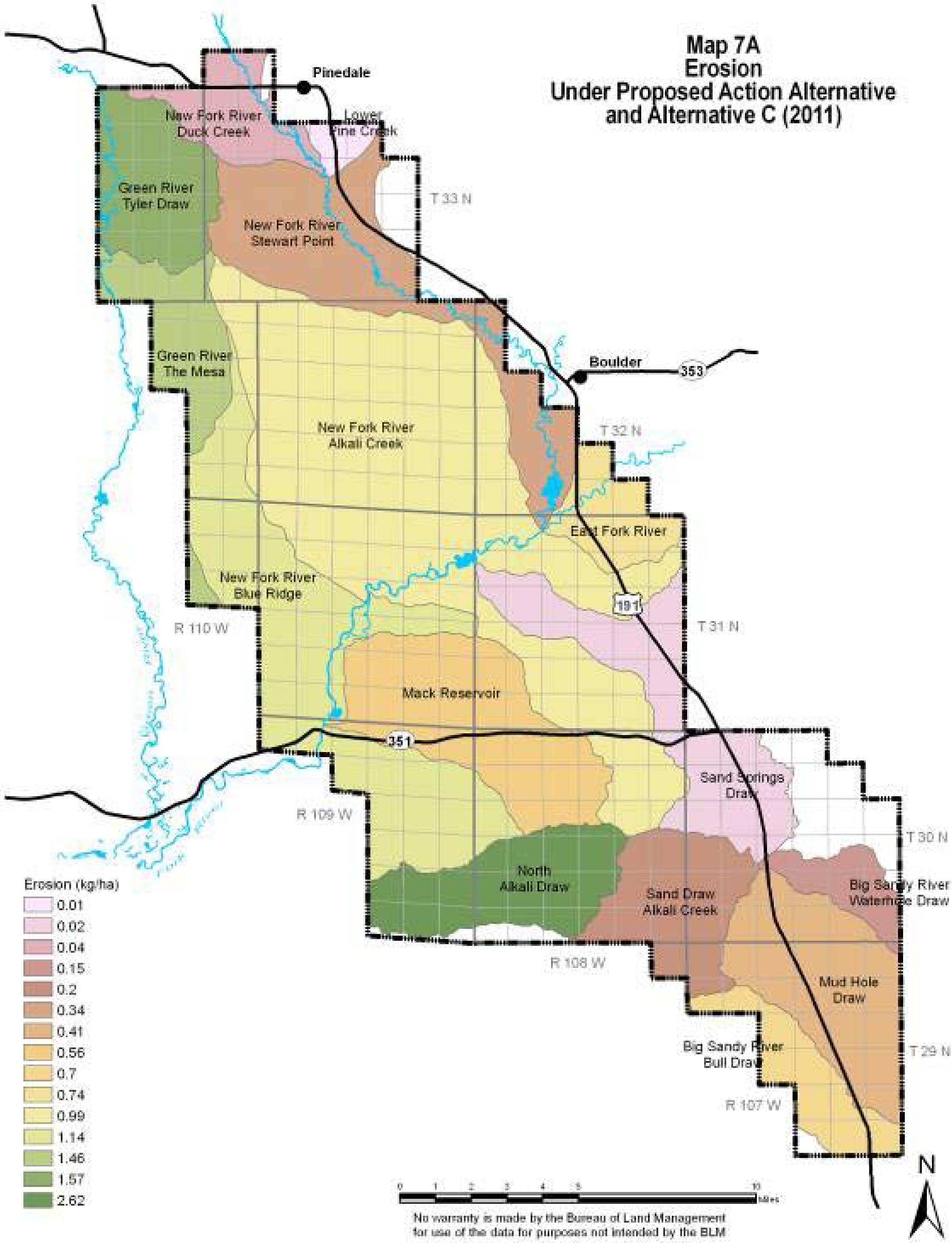
N


Map 7A
Erosion
Under Proposed Action Alternative
and Alternative C (2011)
Pinedale
Boulder
New Fork River
Duck Creek
Lower
Pine Creek
Green River
Tyler Draw
New Fork River
Stewart Point
Green River
The Mesa
New Fork River
Alkali Creek
East Fork River
New Fork River
Blue Ridge
Mack Reservoir
Sand Springs
Draw
North
Alkali Draw
Sand Draw
Alkali Creek
Big Sandy River
Watermee Draw
Mud Hole
Draw
Big Sandy River
Bull Draw
T 33 N
T 32 N
T 31 N
T 30 N
T 29 N
R 110 W
R 109 W
R 108 W
R 107 W
353
191
351
Erosion (kg/ha)
0.01
0.02
0.04
0.15
0.2
0.34
0.41
0.56
0.7
0.74
0.99
1.14
1.46
1.57
2.62
No warranty is made by the Bureau of Land Management
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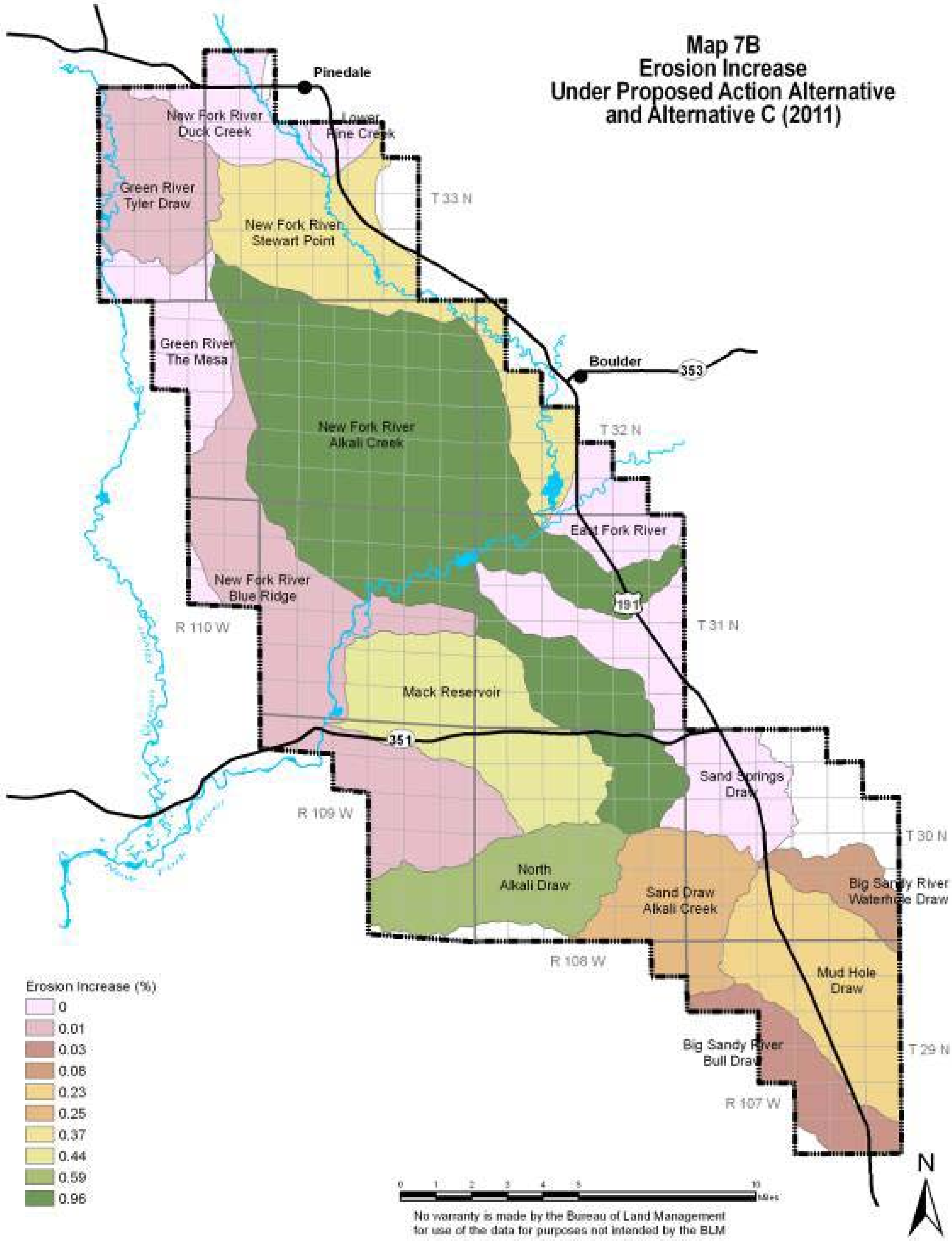
N


Map 7B
Erosion Increase
Under Proposed Action Alternative
and Alternative C (2011)
Pinedale
Boulder
New Fork River
Duck Creek
Lower
Pine Creek
Green River
Tyler Draw
New Fork River
Stewart Point
Green River
The Mesa
New Fork River
Alkali Creek
East Fork River
New Fork River
Blue Ridge
Mack Reservoir
Sand Springs
Draw
North
Alkali Draw
Sand Draw
Alkali Creek
Big Sandy River
Waterhole Draw
Mud Hole
Draw
Big Sandy River
Bull Draw
T 33 N
T 32 N
T 31 N
T 30 N
T 29 N
R 110 W
R 109 W
R 108 W
R 107 W
353
191
351
Erosion Increase (%)
0
0.01
0.03
0.08
0.23
0.25
0.37
0.44
0.59
0.96
0 1 2 3 4 5 10
Miles
No warranty is made by the Bureau of Land Management
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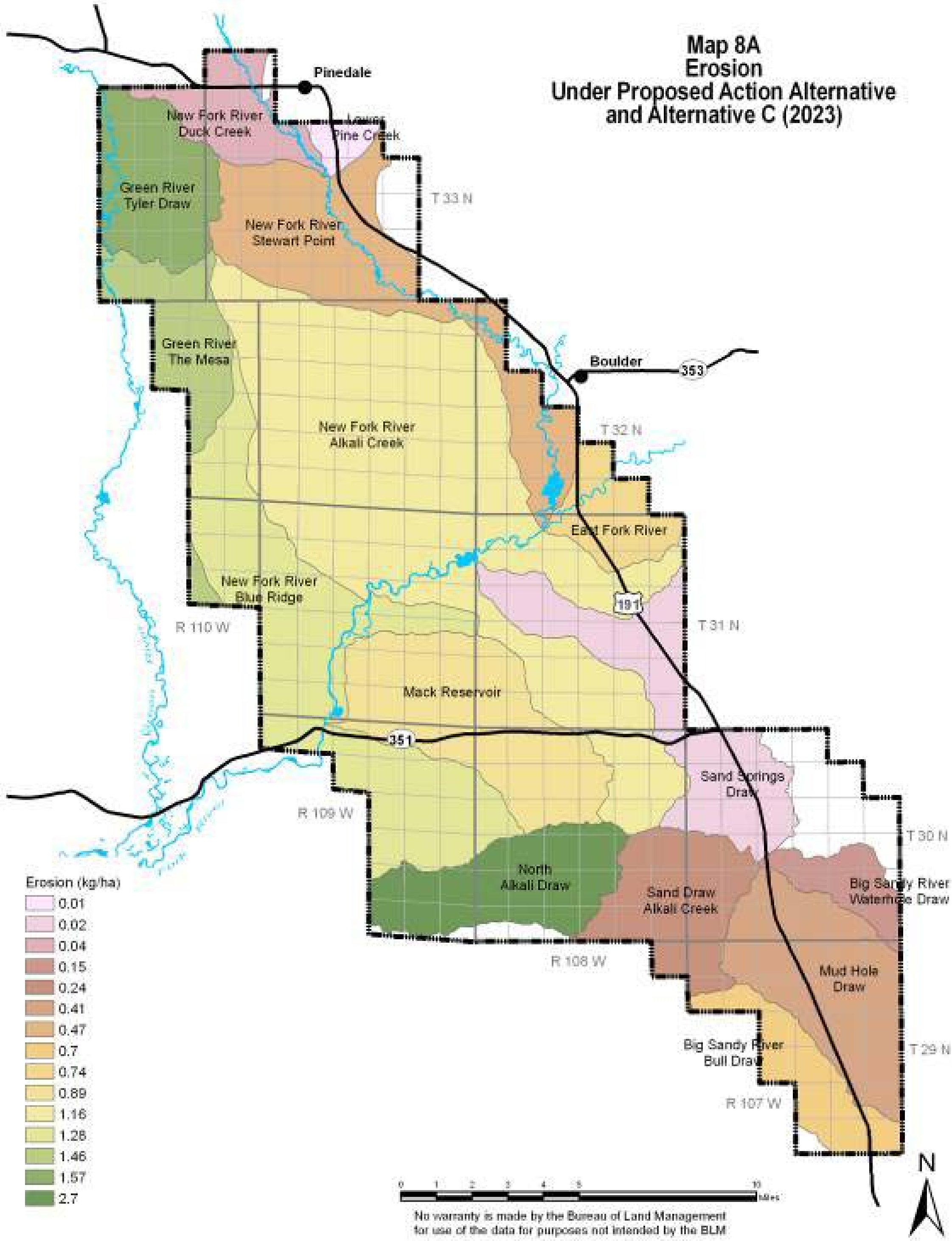
N


Map 8A
Erosion
Under Proposed Action Alternative
and Alternative C (2023)
Pinedale
Boulder
353
191
351
New Fork River Duck Creek
Lower Pine Creek
Green River Tyler Draw
New Fork River Stewart Point
Green River The Mesa
New Fork River Alkali Creek
East Fork River
New Fork River Blue Ridge
Mack Reservoir
Sand Springs Draw
North Alkali Draw
Sand Draw Alkali Creek
Big Sandy River Waterhole Draw
Mud Hole Draw
Big Sandy River Bull Draw
T 33 N
T 32 N
T 31 N
T 30 N
T 29 N
R 110 W
R 109 W
R 108 W
R 107 W
Erosion (kg/ha)
0.01
0.02
0.04
0.15
0.24
0.41
0.47
0.7
0.74
0.89
1.16
1.28
1.46
1.57
2.7
N
No warranty is made by the Bureau of Land Management
for use of the data for purposes not intended by the BLM

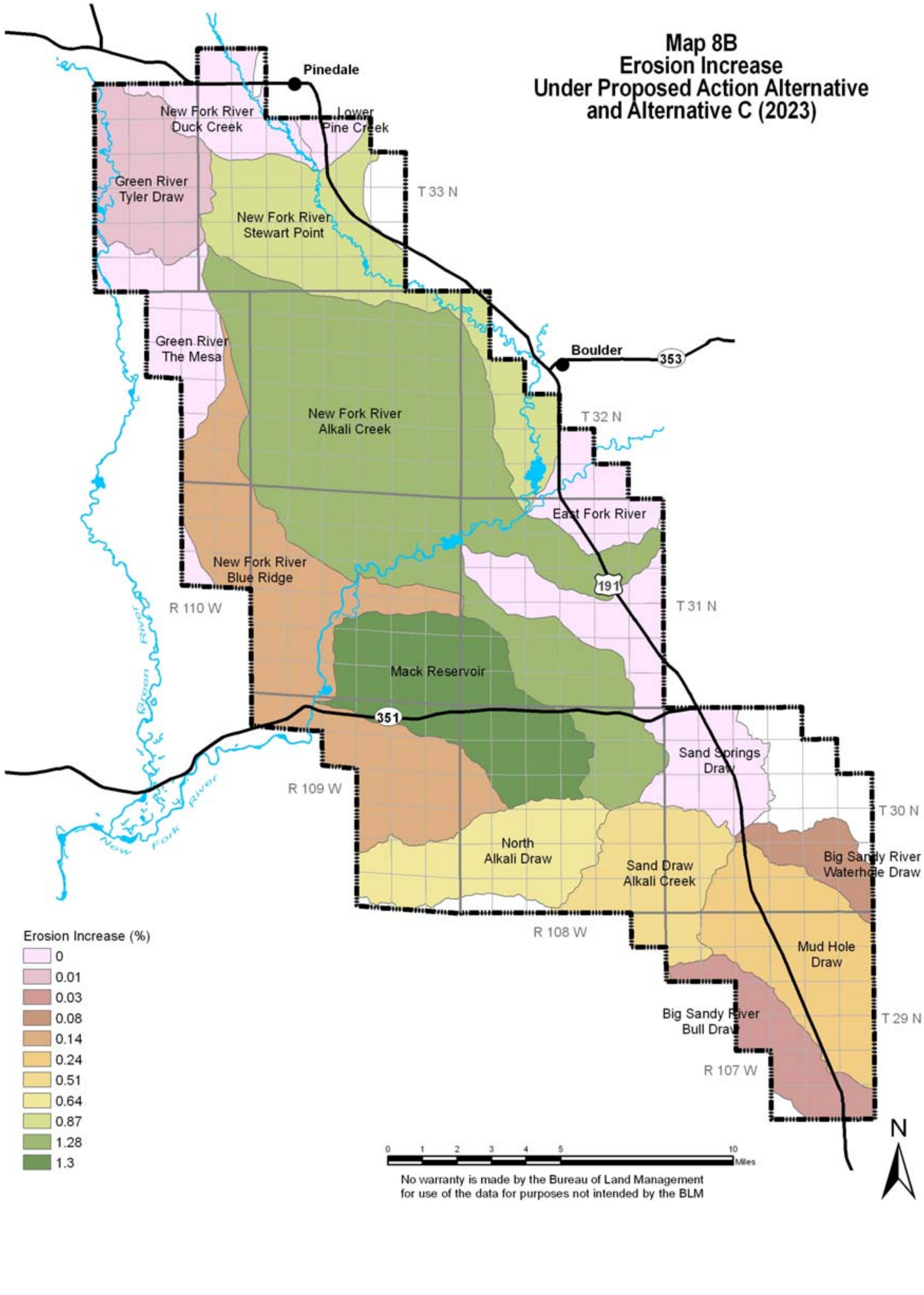

Map 8B
Erosion Increase
Under Proposed Action Alternative
and Alternative C (2023)
Pinedale
Boulder
353
191
351
New Fork River
Duck Creek
Lower
Pine Creek
Green River
Tyler Draw
New Fork River
Stewart Point
Green River
The Mesa
New Fork River
Alkali Creek
East Fork River
New Fork River
Blue Ridge
Mack Reservoir
Sand Springs
Draw
North
Alkali Draw
Sand Draw
Alkali Creek
Big Sandy River
Waterhole Draw
Mud Hole
Draw
Big Sandy River
Bull Draw
T 33 N
T 32 N
T 31 N
T 30 N
T 29 N
R 110 W
R 109 W
R 108 W
R 107 W
Green River
New Fork River
Erosion Increase (%)
0
0.01
0.03
0.08
0.14
0.24
0.51
0.64
0.87
1.28
1.3
0 1 2 3 4 5 10 Miles
No warranty is made by the Bureau of Land Management
for use of the data for purposes not intended by the BLM
N

Table 10. Average Annual Sediment Loss Increase above Current Conditions (end of 2006).

Watershed	Sediment Loss Increase over Current Conditions		
	No Action Alternative (2011)	**Proposed Action Alternative and Alternative C (2011)**	**Proposed Action Alternative and Alternative C (2023)**
Big Sandy River - Bull Draw	0%	0%	0%
Big Sandy River - Waterhole Draw	0%	0%	0%
East Fork River	0%	0%	0%
Green River - The Mesa	0%	0%	0%
Green River - Tyler Draw	1%	1%	1%
Lower Pine Creek	0%	0%	0%
Mack Reservoir	62%	36%	103%
Mud Hole Draw	2%	5%	6%
New Fork River - Alkali Creek	42%	48%	73%
New Fork River - Blue Ridge	2%	1%	13%
New Fork River - Duck Creek	0%	0%	0%
New Fork River - Stewart Point	5%	3%	40%
North Alkali Draw	22%	28%	31%
Sand Draw - Alkali Creek	9%	6%	29%
Sand Springs Draw	0%	0%	0%
PAPA Average	**11%**	**11%**	**20%**

Overall, the projected average increase in sediment loss is 20% for the PAPA, from 0.66 kg/hectare per year for Current Conditions to 0.79 kg/hectare for the Proposed Action Alternative and Alternative C disturbance in 2023. The largest increases in erosion are projected for Mack Reservoir and the New Fork River – Alkali Creek sub-watersheds. Both sub-watersheds contain a large part of the Anticline Crest inside the PAPA. The projected erosion is largest for the largest disturbance, which is projected for the Proposed Action Alternatives and Alternative C in 2023. Of the modeled sub-watersheds, for eight there is no predicted increase or an increase of only 1% in erosion above Current Conditions. These sub-watersheds are the Big-Sandy River – Bull Draw, Big Sandy River – Waterhole Draw, East Fork River, Green River – The Mesa, Green River – Tyler Draw, Lower Pine Creek, New Fork River-Duck Creek, and

Sand Springs Draw. All of these watersheds skirt around the core-development area inside the PAPA, and thus, have less projected disturbances and little projected erosion. In the Mack Reservoir sub-watershed, the total disturbance under the No-Action condition is smaller than the disturbance under the Proposed Action Alternative and Alternative C for 2011; however, the predicted erosion is larger under the No-Action Alternative. This can be explained by noting that the distribution of the disturbed areas is quite different for both alternatives. Under the No Action Alternative, most of the disturbed area is located along the south-east boundary of the sub-watershed. The southeast boundary of the Mack Reservoir sub-watershed has the steepest slopes within the sub-watershed, and is thus much more susceptible to erosion than other less steep areas. The same is true for the sub-watersheds New Fork River - Blue Ridge, and New Fork River - Stewart Point. Sand Draw - Alkali Creek actually has more disturbances under No Action Alternative than under Proposed Action Alternative and Alternative C. Under the Proposed Action Alternative and Alternative C, disturbances are more distributed throughout the watershed, and impact less acreage along the southeast boundary of the watershed. Thus, the impact of erosion is less under the Proposed Action Alternative and Alternative C.

4.2 Sediment Transport during Storms

Based on the results of the erosion modeling, seven sub-watersheds were selected for additional erosion and sediment transport modeling. These watersheds are the New Fork River – Stewart Point, New Fork River – Alkali Creek, Mack Reservoir, New Fork River – Blue Ridge, North Alkali Draw, Sand Draw – Alkali Creek, and Mud Hole Draw.

Of the seven sub-watersheds selected for additional modeling, four are ephemeral sub-watersheds inside the PAPA: Mack Reservoir, Mud Hole Draw, North Alkali Creek, and Sand Draw - Alkali Creek sub-watersheds.

Due to the general low angle slopes in the PAPA, runoff from ephemeral drainages inside the PAPA occurs primarily during large storm events. Most ephemeral drainages do not flow during 5 and 10 year storm events, and thus sediment transport to the New Fork River or the PAPA boundary does not increase during small storms. Erosion and sediment transport may occur on a small scale, but sediment does not travel longer distances to the watershed boundary. Large increases in sediment transport occur only during 25-year or larger storms events. During larger storms, vegetation disturbance (conversion to bare ground) increases the sediment transport significantly. When compared to the No Disturbance (baseline case), sediment transport increases the most for the Proposed Action Alternative and Alternative C in 2023 and the least for the Current Conditions (end of 2006).

The Mack Reservoir sub-watershed drains directly into the New Fork River inside the PAPA. Modeling indicated that flow from Mack Reservoir drainages would not reach the New Fork River until at least a 50-year storm event takes place. Sediment transport would be largest under a 150 year storm (Table 11), but relative increase over baseline or current condition would be largest under a 50 year storm. Sediment transport would increase approximately 4 times over baseline conditions (Table 12), and 1.5 times over current conditions under a 50-year storm (Table 13).

Mud Hole Draw drains into Big Sandy River, and North Alkali Draw and Sand Draw drain into the Green River via Alkali Creek. Sediment transport to the PAPA boundary was modeled for all three sub-watersheds. For all three sub-watersheds, sediment transport would be largest under a 150 year storm (Table 14, Table 17, and Table 20). For Mud Hole Draw, relative sediment transport increase over baseline or current condition would be largest under a 50 year storm. Sediment transport would increase approximately 70% over baseline conditions (Table 15), and 30% over current conditions (Table 16). For North Alkali Draw, relative sediment transport increase over baseline or current condition would be largest under a 150 year storm. Sediment transport would increase approximately 20% over baseline conditions (Table 18), and 10% over current conditions (Table 19).). For Sand Draw, relative sediment transport increase over baseline or current condition would be largest under a 25 year storm. Sediment transport would increase approximately 20 times over baseline conditions (Table 21), and 4 times over current conditions (Table 22).

Table 11. Sediment Yield for Mack Reservoir Sub-Watershed at Confluence with New Fork River.

Storm Return Period (years)	Sediment Yield (Total kg)				
	No Disturbance (Baseline)	Current Conditions (2006)	No Action Alternative (2011)	Proposed Action Alternative and Alternative C (2011)	Proposed Action Alternative and Alternative C (2023)
25	No Flow				
50	381	747	1,607	1,554	1,998
100	27,473	28,880	32,021	31,244	37,856
150	50,975	53,486	59,455	58,456	70,148

Table 12. Sediment Yield Increase above Baseline Conditions for Mack Reservoir Sub-Watershed at Confluence with New Fork River.

Storm Return Period (years)	Sediment Increase over Baseline Conditions			
	Current Conditions (2006)	No Action Alternative (2011)	Proposed Action Alternative and Alternative C (2011)	Proposed Action Alternative and Alternative C (2023)
25	No flow			
50	96%	322%	308%	425%
100	5%	17%	14%	38%
150	5%	17%	15%	38%

Table 13. Sediment Yield Increase above Current Conditions for Mack Reservoir Sub-Watershed at Confluence with New Fork River.

Storm Return Period (years)	Sediment Increase over Current Conditions		
	No Action Alternative (2011)	Proposed Action Alternative and Alternative C (2011)	Proposed Action Alternative and Alternative C (2023)
25			
50	115%	108%	168%
100	11%	8%	31%
150	11%	9%	31%

Table 14. Sediment Yield for Mud Hole Draw Sub-Watershed at PAPA Boundary.

Storm Return Period (years)	Sediment Yield (Total kg)				
	No Disturbance (Baseline)	Current Conditions (2006)	No Action Alternative (2011)	Proposed Action Alternative and Alternative C (2011)	Proposed Action Alternative and Alternative C(2023)
25	6,779	8,678	8,684	8,689	8,724
50	82,266	108,039	119,214	111,660	139,847
100	545,335	667,780	729,301	691,107	822,662
150	853,177	1,043,763	1,133,487	1,078,959	1,252,908

Table 15. Sediment Yield Increase above Baseline Conditions for Mud Hole Draw Sub-Watershed at PAPA Boundary.

Storm Return Period (years)	Sediment Increase over Baseline Conditions			
	Current Conditions (2006)	No Action Alternative (2011)	Proposed Action Alternative and Alternative C (2011)	Proposed Action Alternative and Alternative C (2023)
25	28%	28%	28%	29%
50	31%	45%	36%	70%
100	22%	34%	27%	51%
150	22%	33%	26%	47%

Table 16. Sediment Yield Increase above Current Conditions for Mud Hole Draw Sub-Watershed at PAPA Boundary.

Storm Return Period (years)	Sediment Increase over Current Conditions		
	No Action Alternative (2011)	Proposed Action Alternative and Alternative C (2011)	Proposed Action Alternative and Alternative C (2023)
25	0%	0%	1%
50	10%	3%	29%
100	9%	3%	23%
150	9%	3%	20%

Table 17. Sediment Yield for North Alkali Draw Sub-Watershed at PAPA Boundary.

Storm Return Period (years)	Sediment Yield (Total kg)				
	No Disturbance (Baseline)	Current Conditions (2006)	No Action Alternative (2011)	Proposed Action Alternative and Alternative C (2011)	Proposed Action Alternative and Alternative C (2023)
25	68	71	71	71	71
50	64,311	68,467	68,455	68,466	68,444
100	456,721	485,648	515,055	498,794	540,375
150	831,366	897,502	952,010	930,110	1,006,912

Table 18. Sediment Yield Increase above Baseline Conditions for North Alkali Draw Sub-Watershed at PAPA Boundary.

Storm Return Period (years)	Sediment Increase over Baseline Conditions			
	Current Conditions (2006)	No Action Alternative (2011)	Proposed Action Alternative and Alternative C (2011)	Proposed Action Alternative and Alternative C (2023)
25	5%	5%	5%	5%
50	6%	6%	6%	6%
100	6%	13%	9%	18%
150	8%	15%	12%	21%

Table 19. Sediment Yield Increase above Current Conditions for the North Alkali Draw Sub-Watershed at PAPA Boundary.

Storm Return Period (years)	Sediment Increase over Current Conditions		
	No Action Alternative (2011)	Proposed Action Alternative and Alternative C (2011)	Proposed Action Alternative and Alternative C (2023)
25	0%	0%	0%
50	0%	0%	0%
100	6%	3%	11%
150	6%	4%	12%

Table 20. Sediment Yield for Sand Draw – Alkali Creek Sub-Watershed at PAPA Boundary.

Storm Return Period (years)	Sediment Yield (Total kg)				
	No Disturbance (Baseline)	Current Conditions (2006)	No Action Alternative (2011)	Proposed Action Alternative and Alternative C (2011)	Proposed Action Alternative and Alternative C (2023)
25	4,681	20,422	60,588	33,894	97,815
50	120,463	169,956	367,896	231,546	522,198
100	522,994	672,812	1,007,203	801,065	1,262,716
150	725,829	881,771	1,253,574	1,033,624	1,563,012

Table 21. Sediment Yield Increase above Baseline Conditions for Sand Draw – Alkali Creek Sub-Watershed at PAPA Boundary.

Storm Return Period (years)	Sediment Increase over Baseline Conditions			
	Current Conditions (2006)	No Action Alternative (2011)	Proposed Action Alternative and Alternative C (2011)	Proposed Action Alternative and Alternative C (2023)
25	336%	1194%	624%	1989%
50	41%	205%	92%	333%
100	29%	93%	53%	141%
150	21%	73%	42%	115%

Table 22. Sediment Yield Increase above Current Conditions for Sand Draw – Alkali Creek Sub-Watershed at PAPA Boundary.

Storm Return Period (years)	Sediment Increase over Current Conditions		
	No Action Alternative (2011)	Proposed Action Alternative and Alternative C (2011)	Proposed Action Alternative and Alternative C (2023)
25	197%	66%	379%
50	116%	36%	207%
100	50%	19%	88%
150	42%	17%	77%

Sediment is transported to and within the New Fork River. Three large sub-watersheds of the New Fork River are within the PAPA, New Fork River - Stewart Point, New Fork River - Alkali Creek, and New Fork River - Blue Ridge. Under the Proposed Action Alternative and Alternative C, all three sub-watersheds would experience increased sediment transport in the New Fork River, caused by flow from ephemeral drainages into the New Fork River as well as from direct sediment washing into the stream. Each sub-watershed of the New Fork River is larger than can be modeled with KINEROS2. KINEROS2 is designed to simulate runoff and erosion for single storm events in small watersheds less than approximately 100 km^2 (~25,000 acres). Stewart Point sub-watershed contains over 32,000 acres, Blue Ridge contains almost 40,000 acres, and Alkali Creek contains almost 50,000 acres. In addition, the three sub-watersheds cannot be considered independently of each other, and should be modeled together, because changes in the upstream flow regime of the New Fork River will influence the downstream flow in the lower sub-watersheds. Increases in sediment load were estimated for the New Fork River; however, it has to be noted that these are very rough estimates, calculated by assuming the different sections of the New Fork River can be considered independently. Estimates for sediment yield increases for the New Fork River are given in below (Table 22, Table 23, Table 24, Table 25, Table 26, Table 27, and Table 28.)

Table 23. Sediment Yield Increase above Baseline Conditions for New Fork River – Stewart Point.

Storm Return Period (years)	Sediment Increase over Baseline Conditions			
	Current Conditions (2006)	No Action Alternative (2011)	Proposed Action Alternative and Alternative C (2011)	Proposed Action Alternative and Alternative C (2023)
25	20%	20%	30%	70%
50	10%	20%	20%	50%
100	10%	20%	20%	50%
150	10%	20%	20%	50%

Table 24. Sediment Yield Increase above Current Conditions for the New Fork River – Stewart Point.

Storm Return Period (years)	Sediment Increase over Current Conditions		
	No Action Alternative (2011)	Proposed Action Alternative and Alternative C (2011)	Proposed Action Alternative C (2023)
25	10%	10%	50%
50	10%	10%	30%
100	10%	10%	30%
150	10%	10%	30%

Table 25. Sediment Yield Increase above Baseline Conditions for New Fork River – Alkali Creek.

Storm Return Period (years)	Sediment Increase over Baseline Conditions			
	Current Conditions (2006)	No Action Alternative (2011)	Proposed Action Alternative and Alternative C (2011)	Proposed Action Alternative and Alternative C (2023)
25	0%	10%	0%	10%
50	10%	60%	40%	130%
100	50%	220%	210%	330%
150	50%	180%	180%	270%

Table 26. Sediment Yield Increase above Current Conditions for the New Fork River – Alkali Creek.

Storm Return Period (years)	Sediment Increase over Current Conditions		
	No Action Alternative (2011)	Proposed Action Alternative and Alternative C (2011)	Proposed Action Alternative and Alternative C (2023)
25	10%	0%	10%
50	50%	30%	110%
100	110%	110%	180%
150	80%	80%	140%

Table 27. Sediment Yield Increase above Baseline Conditions for the New Fork River – Blue Ridge at PAPA Boundary.

Storm Return Period (years)	Sediment Increase over Baseline Conditions			
	Current Conditions (2006)	No Action Alternative (2011)	Proposed Action Alternative and Alternative C (2011)	Proposed Action Alternative and Alternative C (2023)
25	0%	10%	0%	20%
50	0%	20%	20%	50%
100	20%	70%	70%	120%
150	30%	80%	80%	130%

Table 28. Sediment Yield Increase above Current Conditions for the New Fork River – Blue Ridge at PAPA Boundary.

Storm Return Period (years)	Sediment Increase over Current Conditions		
	No Action Alternative (2011)	Proposed Action Alternative and Alternative C (2011)	Proposed Action Alternative C (2023)
25	10%	0%	10%
50	20%	10%	40%
100	50%	50%	80%
150	40%	40%	70%

All modeling is based on assumptions and many simplifications are inherent when creating input parameters for SWAT and KINEROS2. Thus, the actual values of sediment transported should be considered with caution. However, the differences in model-derived sediment transport volumes among the analyzed conditions/alternatives and among precipitation events provide approximate values suitable for comparison. Specific monitoring and sampling in the PAPA channels would provide more accurate data of environmental conditions, and if conducted, these data could be compared with the model results presented herein for verification.

4.3 Salt Loading to Green River

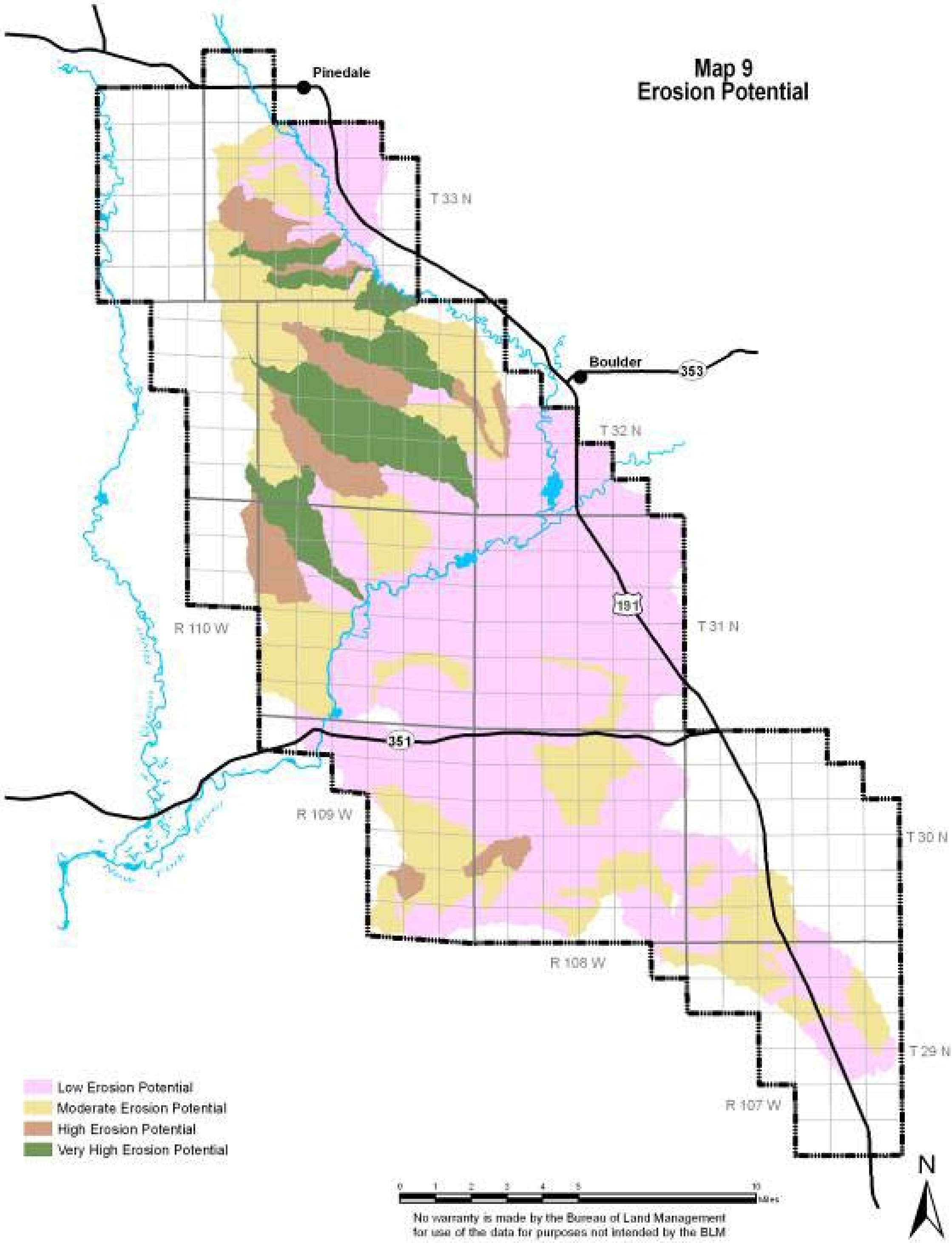
Salinity in all waters leaving the PAPA was estimated as ranging from approximately 300 to 1,300 mg/L as total dissolved solids (TDS). Salinity at the PAPA boundary can be estimated from the measured soil saturation extract salinity or electric conductivity. The saturation extract salinity is assumed to be the maximum salinity of water in contact with sediment. Actual salinity may be lower, if the contact time between water and sediment is not long enough to reach equilibrium or if only a portion of the water volume is in contact with the sediment; both of these conditions are likely during most storm events. Saturation extract salinity has been measured for only seven of the various soil series within the PAPA and was estimated for the other soil series, so only a rough estimate for the maximum salinity for all sub-watersheds can be provided.

Measured salinity in the New Fork River near Big Piney (USGS, 2006) ranges from 40 mg/L TDS (0.06 dS/m) to 280 mg/L TDS (0.42 dS/m), with an average of 130 mg/l TDS (0.19 dS/m), based on 283 USGS measurements of specific conductance between 1965 and 1986. Storm runoff from the PAPA is likely higher in salinity, and even under undisturbed conditions would add additional salt loading to the New Fork, and thus the Green River. Increased sediment load from increased disturbances would increase the salinity added to the New Fork and the Green River. Field measurements of salinity in flowing streams could quantify the salt loading under current conditions.

4.4 Areas Most Susceptible to Erosion

Erosion potential depends on slope, soil type, and vegetation cover. Since most of the development within the PAPA will take place on the Anticline Crest, erosion potential for the Anticline Crest was analyzed for this study. To delineate areas within the Anticline Crest with the greatest potential for erosion, sub-watersheds were subdivided into smaller sections and were analyzed for their sediment yield under the No Disturbance (baseline conditions) scenario for a 150-year storm. However, the ranking of the sub-watersheds across alternatives with respect to erosion potential would not change under any other rainfall scenario.

Areas (sub-watersheds) along the steeper ridges within the PAPA have the greatest potential for erosion after disturbance. Map 9 illustrates the potential for erosion in the PAPA. The erosion potential is given as "low", "moderate" "high", and "very high". This is a relative classification scheme based on the overall erosion potential inside the PAPA. Areas with "low" erosion potential have erosion potential less than the mean erosion potential inside the PAPA, "moderate" erosion potential signifies the mean erosion potential inside PAPA (erosion potential ranges from mean to mean plus one standard deviation), "high" signifies the erosion potential ranges from mean plus one standard deviation to mean plus two standard deviations, and "very high" signifies erosion potential is higher than mean PAPA erosion potential plus two standard deviations.


Map 9
Erosion Potential
Pinedale
Boulder
353
351
191
T 33 N
T 32 N
T 31 N
T 30 N
T 29 N
R 110 W
R 109 W
R 108 W
R 107 W
Low Erosion Potential
Moderate Erosion Potential
High Erosion Potential
Very High Erosion Potential
No warranty is made by the Bureau of Land Management
for use of the data for purposes not intended by the BLM
N

5 CONCLUSIONS

All model alternatives increase erosion and sediment transport into and from the PAPA. Modeled erosion and sediment transport is largest for the Proposed Action Alternative and Alternative C in 2023. Erosion and sediment transport also increase with rainfall intensity. The New Fork River flows directly through the PAPA and additional sediment from erosion would flow into the New Fork River and, thus, also reach the Green River. The modeling assumed that no measures were taken to prevent erosion and sediment transport. However, due to the proximity of the New Fork River and Green River, best management practices (e.g., revegetation, sediment control structures) would have to be used to prevent erosion and minimize sediment transport. Areas and sub-watersheds that are most susceptible to erosion, and create the largest amount of sediment have been identified, and these areas are recommended to receive the most aggressive monitoring (e.g., photo-point, vegetation, channel cross section, first flush) and soil erosion control measures/treatments.

Impact Summary for Proposed Action Alternative and Alternative C:

- Average annual water-caused erosion in the PAPA area would increase above current conditions. The increase would be 11% for disturbances expected in the year 2011 and 20% for disturbances in the year 2023. This assumes no erosion control measures, mitigation or reclamation takes place.
- Sediment transport from ephemeral drainages into the New Fork River would increase significantly during 25-year and larger storm events. From the Mack Reservoir sub-watershed, sediment transport into the New Fork River would increase approximately 1.5 times during a 50-year storm over a 50-year storm occurring under current conditions.
- Sediment transport from ephemeral drainages to the PAPA boundary would increase significantly during 25-year and larger storm events. Most affected would be the Sand Draw sub-watershed. Sediment transport to the PAPA boundary would increase approximately 4 times during a 25-year storm over a 25-year storm occurring under current conditions.
- Salinity in runoff from disturbed areas would increase and could potentially increase salt loading in the Green River.
- All statements above assume no erosion control measures, mitigation or reclamation takes place.

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ATTACHMENT A: KINEROS2 PRECIPITATION INPUT FILE

Only a sample input file for 5-year storm is presented here.

```
! Design storm computed from the AGWA database dsgnstrm.dbf using the SCS
methodology with a type II distribution
! Storm generated for the w2kin watershed using the design storm for Jonah
"! Return Period (frequency) = 5 years, Duration = 24.00 hours."
! ** Return period depth has NOT been reduced for watershed area.


BEGIN RG1
N = 145

   TIME DEPTH  TIME DEPTH  TIME DEPTH  TIME DEPTH  TIME DEPTH
!  (min) (mm)  (min) (mm)  (min) (mm)  (min) (mm)  (min) (mm)
   0     0.00   310  2.35   620   7.01   930 30.81  1240   34.16
   10    0.06   320  2.45   630   7.30   940 30.96  1250   34.24
   20    0.13   330  2.54   640   7.62   950 31.11  1260   34.32
   30    0.19   340  2.64   650   7.97   960 31.26  1270   34.40
   40    0.25   350  2.74   660   8.36   970 31.40  1280   34.47
   50    0.32   360  2.85   670   8.80   980 31.53  1290   34.55
   60    0.38   370  2.95   680   9.33   990 31.66  1300   34.62
   70    0.45   380  3.06   690   9.97  1000 31.79  1310   34.69
   80    0.52   390  3.17   700  10.82  1010 31.92  1320   34.76
   90    0.59   400  3.29   710  12.17  1020 32.04  1330   34.83
   100   0.66   410  3.40   720  17.78  1030 32.16  1340   34.90
   110   0.73   420  3.52   730  23.39  1040 32.27  1350   34.97
   120   0.80   430  3.64   740  24.74  1050 32.39  1360   35.04
   130   0.87   440  3.77   750  25.59  1060 32.50  1370   35.11
   140   0.94   450  3.90   760  26.23  1070 32.61  1380   35.18
   150   1.01   460  4.03   770  26.76  1080 32.71  1390   35.24
   160   1.09   470  4.16   780  27.20  1090 32.82  1400   35.31
   170   1.16   480  4.30   790  27.59  1100 32.92  1410   35.37
   180   1.24   490  4.45   800  27.94  1110 33.02  1420   35.43
   190   1.32   500  4.60   810  28.26  1120 33.11  1430   35.50
   200   1.40   510  4.75   820  28.55  1130 33.21  1440   35.56
   210   1.48   520  4.91   830  28.82  1140 33.30   SA = 0.2
   220   1.56   530  5.08   840  29.07  1150 33.40   END
   230   1.64   540  5.25   850  29.30  1160 33.49  !duration: 1440
   240   1.72   550  5.44   860  29.53  1170 33.58
   250   1.81   560  5.63   870  29.74  1180 33.66
   260   1.90   570  5.82   880  29.93  1190 33.75
   270   1.98   580  6.03   890  30.12  1200 33.84
   280   2.07   590  6.26   900  30.31  1210 33.92
   290   2.16   600  6.49   910  30.48  1220 34.00
   300   2.26   610  6.74   920  30.65  1230 34.08
```

ATTACHMENT B: SOIL DATABASE TABLES

Soil data from the Burma Soil Survey (ERO 1988) and the new NRCS survey for the PAPA were put into Statsgo format, in order to allow AGWA to read the data and use it to estimate the infiltration, runoff, and sediment transport parameters. The first soil database table from the Statsgo data which AGWA reads is called comp.dbf. This file contains the following fields:

STSSAID	State Soil Survey Area ID
MUID	Map Unit Identification
SEQNUM	Sequence Number
MUSYM	Map Unit Symbol
COMPNAME	Component Name
S5ID	Soil Interpretations Record Number
COMPPCT	Component Percent
SLOPEL	Soil Slope (Minimum)
SLOPEH	Soil Slope (Maximum)
SURFTEX	Surface Soil Texture
OTHERPH	Phase Class (other than slope or texture)
COMPKIND	Kind of Component (S=Series, F=Family, V=Variant, M=Miscellaneous)
COMPACRE	Component Acres
CLASCODE	Taxonomic Classification Code
ANFLOOD	Annual Flooding Frequency (Descriptive)
ANFLODUR	Flood Duration Class (Descriptive)
ANFLOBEG	Month in which annual flooding begins in a normal year
ANFLOEND	Month in which annual flooding ends in a normal year
GSFLOOD	Growing Season Flooding (Descriptive)
GSFLODUR	Growing Season Flood Duration (Descriptive)
GSFLOBEG	Month in which annual flooding begins during growing season
GSFLOEND	Month in which annual flooding ends during growing season
WTDEPL	Depth to high Water Table (Minimum)
WTDEPH	Depth to high Water Table (Maximum)
WTKIND	Water Table Kind (Artesian, Perched, Apparent)
WTBEG	Month in which seasonal water table occurs at the depth specified in a normal year
WTEND	Month in which seasonal water table subsides below the normal year depth
PNDDEPL	Ponding Depth (Minimum)
PNDDEPH	Ponding Depth (Maximum)
PNDDUR	Ponding Duration
PNDBEG	
PNDEND	
ROCKDEPL	Depth to Bedrock (Minimum) Inches
ROCKDEPH	Depth to Bedrock (Maximum) Inches
ROCKHARD	Bedrock Hardness (Descriptive)
PANDEPL	Depth to Cemented Pan (Minimum) Inches
PANDEPH	Depth to Cemented Pan (Maximum) Inches
PANHARD	Cemented Pan Thickness (Descriptive)
SUBINITL	Min. value in initial subsidence when drained, in inches (organic soils only)
SUBINITH	Max. value in initial subsidence when drained, in inches (organic soils only)

SUBTOTL	Min. value in total subsidence when drained, in inches (organic soils only)
SUBTOTH	Max. value in total subsidence when drained, in inches (organic soils only)
HYDGRP	Hydrologic Group
FROSTACT	Potential Frost Action (Descriptive)
DRAINAGE	Code identifying the natural soil drainage condition. Example: Well Drained (W); Excessive (E); Moderately Well (MW); Poorly (P); Somewhat Excessively (SE); Somewhat Poorly (SP)
HYDRIC	Hydric Soil Rating
CORCON	A rating of concrete susceptibility to corrosion when in contact with the soil
CORSTEEL	A rating of the uncoated steel susceptibility to corrosion when in contact with soil
CLNIRR	A rating of the soil for nonirrigated agricultural use
CLIRR	Irrigated Capability Class
SCLNIRR	Irrigated Capability Subclass
SCLIRR	Irrigated Capability Subclass
PRIMFML	Prime Farmland Classification

From this table, AGWA reads the composition percentages and surface texture for each soil. Table B-1 presents the part of the comp.dbf table read by AGWA and populated with data from the Burma Soil Survey and the new NRCS survey for the PAPA. MUID numbers between PD100 and PD129 indicate soil data from the Burma Survey, MUID numbers higher than PD400 indicate soil data from the NRCS survey.

Table B-1: Composition percentages and Textures for PAPA Soils

MUID	SEQNUM	COMPNAME	COMPPCT	SURFTEX
PD100	1	Horsley	40	L
PD100	2	BADLAND	33	UWB
PD100	3	Boltus	27	CL
PD102	1	Langspring Variant	72	L
PD102	2	Langspring	28	L
PD103	1	Terada	44	FSL
PD103	2	Huguston	37	SL
PD103	3	Fraddle	19	SL
PD104	1	Chrisman	100	SiC
PD105	1	FLUVENTS	100	VAR
PD106	1	Monte	67	L
PD106	2	Leckman	33	L
PD107	1	Leckman	100	SL
PD108	1	Dines	45	L
PD108	2	Clowers	33	L
PD108	3	Quealman	22	L
PD109	1	FLUVENTS	100	VAR
PD110	1	Fraddle	72	L
PD110	2	Tresano	28	L
PD111	1	Fraddle	50	SL
PD111	2	SPACE CITY	28	LS
PD111	3	KOONICH	22	LS
PD112	1	KOONICH	100	LS
PD113	1	Haterton	53	L

PD113	2	Garsid	47	L
PD114	1	Ouard	35	L
PD114	2	Ouard Variant	35	C
PD114	3	Boltus	30	Sh
PD116	1	Huguston	44	L
PD116	2	Horsley	39	Sh
PD116	3	Terada	17	L
PD117	1	Huguston	53	SL
PD117	2	ROCK OUTCROP	23	UWB
PD117	3	Boltus	24	CL
PD119	1	Garsid	53	L
PD119	2	Monte	47	L
PD120	1	KANDALY	50	LS
PD120	2	Terada	28	FSL
PD120	3	Huguston	22	SL
PD121	1	Garsid	47	L
PD121	2	Terada	29	L
PD121	3	Langspring Variant	24	L
PD122	1	Baston	44	C
PD122	2	Boltus	31	Sh
PD122	3	Chrisman	25	C
PD123	1	Spool Variant	41	S
PD123	2	Ouard Variant	41	C
PD123	3	San Arcacio Variant	18	L
PD124	1	Fraddle	35	L
PD124	2	Ouard	35	L
PD124	3	San Arcacio Variant	30	L
PD125	1	San Arcacio	56	LS
PD125	2	Saguache	44	SL
PD127	1	Vermillion Variant	39	L
PD127	2	Seedskadee	39	L
PD127	3	Fraddle	22	L
PD128	1	Fraddle	56	L
PD128	2	Ouard	22	L
PD128	3	San Arcacio Variant	22	L
PD129	1	Dunul Variant	47	GRV-SL
PD129	2	Garsid	30	CL
PD129	3	Boltus	23	CL
PD401	1	Havermon	53	CL
PD401	2	Tismid	27	SL
PD401	3	Giarch, eroded	20	SCL
PD425	1	Maysprings	43	SL
PD425	2	Ryark	40	LCOS
PD425	3	Comer	17	COSL
PD427	1	Ryark	50	COSL
PD427	2	Hawkstone	25	COSL
PD427	3	Cotha	15	COSL
PD427	4	Maysprings	10	GR-COSL
PD432	1	Pinelli	100	L
PD435	1	Hawkstone	37	LCOS
PD435	2	Ryark	63	SL

PD437	1	Almy	72	SL
PD437	2	Bluerim	28	SL
PD438	1	Almy	30	SL
PD438	2	Bluerim	25	SL
PD438	3	Cotha	20	COSL
PD438	4	Milren	15	COSL
PD438	5	Comer	10	SCL
PD451	1	Kandaly	32	LFS
PD451	2	Maysprings	42	FSL
PD451	3	Ryark	26	FS
PD522	1	Bluerim	45	COSL
PD522	2	Zagspeed	35	COSL
PD522	3	Cotha	10	COSL
PD522	4	Elk Mountain	5	SL
PD522	5	Milren	5	SL
PD533	1	Bluerim	59	SL
PD533	2	Rock River	41	GR-COSL
PD536	1	Bluerim	44	GR-COSL
PD536	2	Forelle	39	SL
PD536	3	Diamondville	17	SL
PD543	1	Toney	47	GR-SL
PD543	2	Forelle	29	GR-SL
PD543	3	Bluerim	24	SL
PD550	1	Bluerim	40	SL
PD550	2	Maysprings	25	SL
PD550	3	Tigon	20	SL
PD550	4	Diamondville	15	GR-SL
PD562	1	Bluerim	62	SL
PD562	2	Forelle	38	COSL
PD565	1	Zagpeed	31	SL
PD565	2	Bluerim	45	SL
PD565	3	Boettcher	19	L
PD565	4	Rock Outcrop	5	UWB
PD568	1	Forelle	44	SL
PD568	2	Bluerim	39	SL
PD568	3	Zagpeed	17	L
PD569	1	Forelle	40	SL
PD569	2	Bluerim	27	SL
PD569	3	Tigon	20	SL
PD569	4	Byrnie	13	LCOS
PD581	1	Worfka	50	GR-C
PD581	2	Kemmerer	25	CL
PD581	3	Glassner	20	C
PD581	4	BADLAND	5	UWB
PD584	1	Forelle	36	COSL
PD584	2	Bluerim	27	CB-SL
PD584	3	Manburn	16	L
PD584	4	Blackhall	16	LCOS
PD584	5	Rock Outcrop	5	UWB
PD587	1	Bluerim	76	L
PD587	2	Cotha	19	GR-SL

PD587	3	Rock Outcrop	5	UWB
PD615	1	Bluerim	40	SL
PD615	2	Tigon	25	GR-COSL
PD615	3	Zagpeed	25	COSL
PD615	4	BADLAND	5	UWL
PD615	5	Rock Outcrop	5	UWL
PD701	1	Manburn	39	GR-LCOS
PD701	2	Bluerim	23	LCOS
PD701	3	Zagpeed	23	COSL
PD701	4	BADLAND	15	UWL
PD702	1	Forelle	38	SCL
PD702	2	Cushool	31	L
PD702	3	Forelle, 40	31	CNV-SCL
PDBL	1	BADLAND	100	UWB
PDW	1	WATER	100	L

The second soil database table from the Statsgo data, which AGWA reads in order to estimate the infiltration, runoff, and sediment transport parameters, is called layer.dbf. This file contains the following fields:

STSSAID State Soil Survey Area ID
MUID Map Unit Identification
SEQNUM Sequence Number
S5ID Soil Interpretations Record Number
LAYERNUM Layer Number
LAYERID convention to identify the original layers on the Number SOI-5 record. Example: layerid 11 for the first surface of a multisurface record, 12 for the second surface layer, 2 through 9 for subsurface layers
LAYDEPL depth to upper boundary of soil layer, inches
LAYDEPH depth to lower boundary of soil layer, inches
TEXTURE1
TEXTURE2
TEXTURE3
KFACT Soil Erodibility Factor, includes adjustment for rock fragments
KFFACT Soil Erodibility Factor, without adjustment for rock fragments Used in SWAT
TFACT Soil loss tolerance factor.
WEG Wind Erodibility Group
INCH10L weight of the rock fragments greater than 10 inches size, in percent (minimum)
INCH10H weight of the rock fragments greater than 10 inches size, in percent (maximum)
INCH3L weight of the rock fragments 3 to 10 inches size, in percent (minimum)
INCH3H weight of the rock fragments 3 to 10 inches size, in percent (maximum)
NO4L Percent Passing Sieve Number 4 (Minimum)
NO4H Percent Passing Sieve Number 4 (Maximum)
NO10L Percent Passing Sieve Number 10 (Minimum)
NO10H Percent Passing Sieve Number 10 (Maximum)
NO40L Percent Passing Sieve Number 40 (Minimum)
NO40H Percent Passing Sieve Number 40 (Maximum)
NO200L Percent Passing Sieve Number 200 (Minimum)
NO200H Percent Passing Sieve Number 200 (Maximum)

CLAYL	Clay Content of Material less than 2 mm in size (Minimum)
CLAYH	Clay Content of Material less than 2 mm in size (Maximum)
LLL	Liquid Limit in percent moisture by weight (Minimum)
LLH	Liquid Limit in percent moisture by weight (Minimum)
PIL	Plasticity Index (Minimum)
PIH	Plasticity Index (Maximum)
UNIFIED1	Unified Soil Classification (engineering)
UNIFIED2	Unified Soil Classification (engineering)
UNIFIED3	Unified Soil Classification (engineering)
UNIFIED4	Unified Soil Classification (engineering)
AASHTO1	AASHTO (American Assoc. of State Highway Classification and Transportation Officials) group classification
AASHTO2	AASHTO (American Assoc. of State Highway Classification and Transportation Officials) group classification
AASHTO3	AASHTO (American Assoc. of State Highway Classification and Transportation Officials) group classification
AASHTO4	AASHTO (American Assoc. of State Highway Classification and Transportation Officials) group classification
AASHIND	A AASHTO (American Assoc. of State Highway Classification and Transportation Officials) group index
AWCL	Available Water Capacity (Minimum)
AWCH	Available Water Capacity (Maximum)
BDL	Bulk Density (Minimum)
BDH	Bulk Density (Maximum)
OML	Organic Matter, percent by weight (Minimum)
OMH	Organic Matter, percent by weight (Maximum)
PHL	Soil Reaction (pH) (Minimum)
PHH	Soil Reaction (pH) (Maximum)
SALINL	Salinity (Minimum)
SALINH	Salinity (Maximum)
SARL	Sodium Absorption Ratio (Minimum)
SARH	Sodium Absorption Ratio (Maximum)
CECL	Cation Exchange Capacity (Minimum)
CECH	Cation Exchange Capacity (Maximum)
CACO3L	Carbonate as $CaCO_3$, percent (Minimum)
CACO3H	Carbonate as $CaCO_3$, percent (Maximum)
GYPSUML	Sulfates as $CaSO_4$ (gypsum), percent (Maximum)
GYPSUMH	Sulfates as $CaSO_4$ (gypsum), percent (Minimum)
PERML	Permeability Rate inches/hour (Minimum)
PERMH	Permeability Rate inches/hour (Minimum)
SHRINKSW	Shrink-Swell Potential

This file, showing only the populated fields for the soils of the PAPA project, is in shown in Table B-2.

Table B-2: Layer Composition for PAPA Soils

MUID	SEQNUM	LAYERNUM	LAYDEPL	LAYDEPH	TEXTURE1	TEXTURE 2	TEXTURE3	KFACT	KFFACT	INCH10L	INCH10H	INCH3L	INCH3H	NO4L	NO4H	NO10L	NO10H	NO40L	NO40H	NO200L	NO200H	CLAYL	CLAYH	AWCL	AWCH	BDL	BDH	OML	OMH	PERML	PERMH
PD100	1	1	0	3	L			0.15	0.15	0	0	0	0	50	75	50	75	45	65	35	50	18	27	0.11	0.15	1.30	1.40	0.0	1.0	0.60	2.00
PD100	1	2	3	9	L	CL	SCL	0.37	0.37	0	0	0	0	90	100	75	100	60	80	50	60	18	35	0.15	0.20	1.30	1.40	0.0	1.0	0.60	2.00
PD100	2	1	0	9	UWB			0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	1.30	1.40	0.0	0.0	0.00	0.00
PD100	3	1	0	3	C	CL		0.32	0.32	0	0	0	0	90	100	75	100	75	100	70	100	35	60	0.08	0.10	1.30	1.40	0.0	1.0	0.06	0.20
PD100	3	2	3	11	C	CL		0.32	0.32	0	0	0	0	90	100	75	100	75	100	70	100	35	60	0.08	0.10	1.30	1.40	0.0	1.0	0.06	0.20
PD102	1	1	0	3	L			0.32	0.32	0	0	0	0	95	100	85	100	80	90	65	80	18	34	0.14	0.17	1.30	1.40	2.3	2.3	0.60	2.00
PD102	1	2	3	22	CL	SCL	L	0.32	0.32	0	0	0	0	80	100	75	100	65	85	50	75	18	34	0.13	0.16	1.30	1.40	2.8	2.8	0.60	2.00
PD102	2	1	0	4	L			0.32	0.32	0	0	0	0	95	100	85	100	80	90	65	80	18	27	0.14	0.17	1.30	1.40	0.0	1.0	0.60	2.00
PD102	2	2	4	9	L			0.32	0.32	0	0	0	0	95	100	85	100	80	90	65	80	18	27	0.14	0.17	1.30	1.40	0.0	1.0	0.60	2.00
PD102	2	3	9	40	SCL	L	SL	0.32	0.32	0	0	0	0	80	100	75	100	65	85	50	75	15	27	0.13	0.16	1.30	1.40	0.0	1.0	0.20	0.60
PD103	1	1	0	7	VFSL	FSL	SL	0.32	0.32	0	0	0	0	100	100	100	100	85	95	50	65	5	18	0.15	0.17	1.30	1.40	0.0	1.0	0.60	2.00
PD103	1	2	7	34	VFSL	FSL		0.32	0.32	0	0	0	0	100	100	100	100	85	95	50	65	5	18	0.15	0.17	1.30	1.40	0.0	1.0	0.60	2.00
PD103	2	1	0	2	SL	FSL		0.32	0.32	0	0	0	0	75	100	75	100	55	75	30	40	5	12	0.13	0.15	1.30	1.40	0.0	1.0	2.00	6.00
PD103	2	2	2	9	SL	FSL		0.32	0.32	0	0	0	0	75	100	75	100	55	75	30	40	5	12	0.13	0.15	1.30	1.40	0.0	1.0	2.00	6.00
PD103	3	1	0	4	SL			0.24	0.24	0	0	0	0	90	100	90	100	55	80	30	50	10	20	0.11	0.13	1.30	1.40	1.1	1.1	2.00	6.00
PD103	3	2	4	22	SCL			0.28	0.28	0	0	0	0	90	100	90	100	75	85	35	50	18	34	0.14	0.16	1.30	1.40	0.8	0.8	0.60	2.00
PD104	1	1	0	2	SIC	C	SICL	0.37	0.37	0	0	0	0	95	100	95	100	95	100	90	100	35	60	0.15	0.17	1.30	1.40	0.0	1.0	0.00	0.06
PD104	1	2	2	60	SIC	C	SICL	0.37	0.37	0	0	0	0	95	100	95	100	95	100	90	100	35	60	0.10	0.15	1.30	1.40	0.0	1.0	0.00	0.06
PD105	1	1	0	9	VAR			0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	1.30	1.40	0.0	0.0	0.60	20.00
PD106	1	1	0	2	L			0.24	0.24	0	0	0	10	95	100	90	100	75	95	55	75	15	25	0.16	0.18	1.30	1.40	0.0	1.0	0.60	2.00
PD106	1	2	2	60	CL	L	SL	0.24	0.24	0	0	0	10	95	100	90	100	65	95	45	75	15	34	0.16	0.18	1.30	1.40	0.0	1.0	0.60	2.00
PD106	2	1	0	3	FSL	VFSL		0.32	0.32	0	0	0	0	100	100	100	100	85	95	50	65	10	20	0.15	0.17	1.30	1.40	0.0	1.0	0.60	2.00
PD106	2	2	3	60	FSL	VFSL		0.32	0.32	0	0	0	0	100	100	100	100	85	95	50	65	10	20	0.15	0.17	1.30	1.40	0.0	1.0	0.60	2.00
PD107	1	1	0	3	FSL	VFSL		0.32	0.32	0	0	0	0	100	100	100	100	85	95	50	65	10	20	0.15	0.17	1.30	1.40	0.0	1.0	0.60	2.00
PD107	1	2	3	60	FSL	VFSL		0.32	0.32	0	0	0	0	100	100	100	100	85	95	50	65	10	20	0.15	0.17	1.30	1.40	0.0	1.0	0.60	2.00
PD108	1	1	0	4	SIL			0.37	0.37	0	0	0	0	100	100	100	100	95	100	80	100	18	27	0.09	0.11	1.30	1.40	1.1	1.1	0.20	0.60
PD108	1	2	4	60	SIL	SICL		0.37	0.37	0	0	0	0	100	100	100	100	95	100	80	100	37	35	0.09	0.16	1.30	1.40	1.1	1.1	0.20	0.60
PD108	2	1	0	1	L			0.37	0.37	0	0	0	5	80	100	80	100	80	90	60	75	18	28	0.12	0.14	1.30	1.40	0.0	1.0	0.60	2.00
PD108	2	2	1	60	CL			0.49	0.49	0	0	0	5	80	100	75	100	65	90	50	75	20	40	0.12	0.14	1.30	1.40	0.0	1.0	0.60	2.00
PD108	3	1	0	2	FSL	L	CL	0.32	0.32	0	0	0	0	75	100	75	100	50	75	25	50	10	34	0.11	0.15	1.30	1.40	0.0	1.0	2.00	6.00
PD108	3	2	2	60	SR-LS	L	FSL	0.37	0.37	0	0	0	0	90	100	80	100	40	75	20	35	10	34	0.10	0.13	1.30	1.40	0.0	1.0	2.00	6.00
PD109	1	1	0	9	VAR			0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	1.30	1.40	0.0	0.0	0.60	20.00
PD110	1	1	0	4	SL			0.24	0.24	0	0	0	0	90	100	90	100	55	80	30	50	10	20	0.11	0.13	1.30	1.40	1.1	1.1	2.00	6.00
PD110	1	2	4	22	SCL			0.28	0.28	0	0	0	0	90	100	90	100	75	85	35	50	18	34	0.14	0.16	1.30	1.40	0.8	0.8	0.60	2.00
PD110	2	1	0	2	SL			0.24	0.24	0	0	0	0	80	100	75	90	50	60	25	35	10	20	0.11	0.13	1.30	1.40	0.0	1.0	2.00	6.00
PD110	2	2	2	16	SCL			0.28	0.28	0	0	0	0	80	100	75	90	60	80	35	50	20	30	0.14	0.16	1.30	1.40	0.0	1.0	0.60	2.00
PD111	1	1	0	4	SL			0.24	0.24	0	0	0	0	90	100	90	100	55	80	30	50	10	20	0.11	0.13	1.30	1.40	1.1	1.1	2.00	6.00
PD111	1	2	4	22	SCL			0.28	0.28	0	0	0	0	90	100	90	100	75	85	35	50	18	34	0.14	0.16	1.30	1.40	0.8	0.8	0.60	2.00
PD111	2	1	0	2	LFS	LS		0.15	0.15	0	0	0	0	100	100	95	100	80	95	20	40	4	8	0.07	0.10	1.30	1.40	0.0	1.0	6.00	20.00
PD111	2	2	2	34	LFS	LS		0.15	0.15	0	0	0	0	100	100	95	100	80	95	20	40	4	8	0.07	0.10	1.30	1.40	0.0	1.0	6.00	20.00
PD111	3	1	0	3	SL			0.20	0.20	0	0	10	16	75	90	75	90	50	60	23	35	10	16	0.11	0.13	1.30	1.40	0.0	1.0	6.00	20.00
PD111	3	2	3	18	SL			0.20	0.20	0	0	10	16	75	90	75	90	50	60	23	35	10	16	0.11	0.13	1.30	1.40	0.0	1.0	6.00	20.00
PD112	1	1	0	3	SL			0.20	0.20	0	0	10	16	75	90	75	90	50	60	23	35	10	16	0.11	0.13	1.30	1.40	0.0	1.0	6.00	20.00
PD112	1	2	3	18	SL			0.20	0.20	0	0	10	16	75	90	75	90	50	60	23	35	10	16	0.11	0.13	1.30	1.40	0.0	1.0	6.00	20.00
PD113	1	1	0	3	L			0.37	0.37	0	0	0	0	75	100	75	100	70	100	50	70	18	27	0.16	0.18	1.30	1.40	0.0	1.0	0.60	2.00

PD113	1	2	3	12	L			0.43	0.43	0	0	0	0	75	100	75	100	60	75	50	60	18	27	0.16	0.18	1.30	1.40	0.0	1.0	0.60	2.00
PD113	2	1	0	4	L	CL		0.32	0.32	0	0	0	0	75	100	75	100	75	100	55	75	18	35	0.16	0.18	1.30	1.40	0.0	1.0	0.60	2.00
PD113	2	2	4	22	L	CL		0.32	0.32	0	0	0	0	75	100	75	100	75	100	55	75	18	35	0.16	0.18	1.30	1.40	0.0	1.0	0.60	2.00
PD114	1	1	0	1	SL	SCL		0.24	0.24	0	0	0	0	100	100	100	100	60	70	30	40	18	34	0.11	0.13	1.30	1.40	0.0	1.0	2.00	6.00
PD114	1	2	1	11	SCL			0.28	0.28	0	0	0	0	100	100	100	100	75	90	35	50	18	34	0.14	0.16	1.30	1.40	0.0	1.0	0.60	2.00
PD114	2	1	0	4	CL	L		0.32	0.32	0	0	0	0	95	100	90	100	75	95	55	80	6	25	0.17	0.21	1.30	1.40	1.1	1.1	0.20	0.60
PD114	2	2	4	13	CL	C		0.37	0.37	0	0	0	0	95	100	90	100	90	100	75	95	35	50	0.19	0.21	1.30	1.40	0.9	0.9	0.06	0.20
PD114	3	1	0	3	C	CL		0.32	0.32	0	0	0	0	90	100	75	100	75	100	70	100	35	60	0.08	0.10	1.30	1.40	0.0	1.0	0.06	0.20
PD114	3	2	3	11	C	CL		0.32	0.32	0	0	0	0	90	100	75	100	75	100	70	100	35	60	0.08	0.10	1.30	1.40	0.0	1.0	0.06	0.20
PD116	1	1	0	2	SL	FSL		0.32	0.32	0	0	0	0	75	100	75	100	55	75	30	40	5	12	0.13	0.15	1.30	1.40	0.0	1.0	2.00	6.00
PD116	1	2	2	9	SL	FSL		0.32	0.32	0	0	0	0	75	100	75	100	55	75	30	40	5	12	0.13	0.15	1.30	1.40	0.0	1.0	2.00	6.00
PD116	1	3	9	60	UWB			0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.05	0.15	0.00	0.00	0.0	1.0	2.00	6.00
PD116	2	1	0	3	L			0.15	0.15	0	0	0	0	50	75	50	75	45	65	35	50	18	27	0.11	0.15	1.30	1.40	0.0	1.0	0.60	2.00
PD116	2	2	3	9	L	CL	SCL	0.37	0.37	0	0	0	0	90	100	75	100	60	80	50	60	18	35	0.15	0.20	1.30	1.40	0.0	1.0	0.60	2.00
PD116	2	3	9	60	SH			0.37	0.37	0	0	0	0	90	100	75	100	60	80	50	60	18	35	0.15	0.20	1.30	1.40	0.0	1.0	0.60	2.00
PD116	3	1	0	7	VFSL	FSL	SL	0.32	0.32	0	0	0	0	100	100	100	100	85	95	50	65	5	18	0.15	0.17	1.30	1.40	0.0	1.0	0.60	2.00
PD116	3	2	7	34	VFSL	FSL		0.32	0.32	0	0	0	0	100	100	100	100	85	95	50	65	5	18	0.15	0.17	1.30	1.40	0.0	1.0	0.60	2.00
PD117	1	1	0	2	SL	FSL		0.32	0.32	0	0	0	0	75	100	75	100	55	75	30	40	5	12	0.13	0.15	1.30	1.40	0.0	1.0	2.00	6.00
PD117	1	2	2	9	SL	FSL		0.32	0.32	0	0	0	0	75	100	75	100	55	75	30	40	5	12	0.13	0.15	1.30	1.40	0.0	1.0	2.00	6.00
PD117	2	1	0	9	UWB			0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.0	1.0	0.00	0.00
PD117	3	1	0	3	C	CL		0.32	0.32	0	0	0	0	90	100	75	100	75	100	70	100	35	60	0.08	0.10	1.30	1.40	0.0	1.0	0.06	0.20
PD117	3	2	3	11	C	CL		0.32	0.32	0	0	0	0	90	100	75	100	75	100	70	100	35	60	0.08	0.10	1.30	1.40	0.0	1.0	0.06	0.20
PD119	1	1	0	4	L	CL		0.32	0.32	0	0	0	0	75	100	75	100	75	100	55	75	18	35	0.16	0.18	1.30	1.40	0.0	1.0	0.60	2.00
PD119	1	2	4	22	L	CL		0.32	0.32	0	0	0	0	75	100	75	100	75	100	55	75	18	35	0.16	0.18	1.30	1.40	0.0	1.0	0.60	2.00
PD119	2	1	0	2	L			0.24	0.24	0	0	0	10	95	100	90	100	75	95	55	75	15	25	0.16	0.18	1.30	1.40	0.0	1.0	0.60	2.00
PD119	2	2	2	60	CL	L	SL	0.24	0.24	0	0	0	10	95	100	90	100	65	95	45	75	15	34	0.16	0.18	1.30	1.40	0.0	1.0	0.60	2.00
PD120	1	1	0	4	LFS	LS		0.32	0.32	0	0	0	0	100	100	100	100	75	95	20	35	0	10	0.08	0.10	1.30	1.40	0.0	1.0	6.00	20.00
PD120	1	2	4	60	FS	LS		0.28	0.28	0	0	0	0	100	100	100	100	75	95	5	30	0	7	0.05	0.07	1.30	1.40	0.0	1.0	6.00	20.00
PD120	2	1	0	7	VFSL	FSL	SL	0.32	0.32	0	0	0	0	100	100	100	100	85	95	50	65	5	18	0.15	0.17	1.30	1.40	0.0	1.0	0.60	2.00
PD120	2	2	7	34	VFSL	FSL		0.32	0.32	0	0	0	0	100	100	100	100	85	95	50	65	5	18	0.15	0.17	1.30	1.40	0.0	1.0	0.60	2.00
PD120	3	1	0	2	SL	FSL		0.32	0.32	0	0	0	0	75	100	75	100	55	75	30	40	5	12	0.13	0.15	1.30	1.40	0.0	1.0	2.00	6.00
PD120	3	2	2	9	SL	FSL		0.32	0.32	0	0	0	0	75	100	75	100	55	75	30	40	5	12	0.13	0.15	1.30	1.40	0.0	1.0	2.00	6.00
PD121	1	1	0	4	L	CL		0.32	0.32	0	0	0	0	75	100	75	100	75	100	55	75	18	35	0.16	0.18	1.30	1.40	0.0	1.0	0.60	2.00
PD121	1	2	4	22	L	CL		0.32	0.32	0	0	0	0	75	100	75	100	75	100	55	75	18	35	0.16	0.18	1.30	1.40	0.0	1.0	0.60	2.00
PD121	2	1	0	7	VFSL	FSL	SL	0.32	0.32	0	0	0	0	100	100	100	100	85	95	50	65	5	18	0.15	0.17	1.30	1.40	0.0	1.0	0.60	2.00
PD121	2	2	7	34	VFSL	FSL		0.32	0.32	0	0	0	0	100	100	100	100	85	95	50	65	5	18	0.15	0.17	1.30	1.40	0.0	1.0	0.60	2.00
PD121	3	1	0	3	L			0.32	0.32	0	0	0	0	95	100	85	100	80	90	65	80	18	34	0.14	0.17	1.30	1.40	2.3	2.3	0.60	2.00
PD121	3	2	3	22	CL	SCL	L	0.32	0.32	0	0	0	0	80	100	75	100	65	85	50	75	18	34	0.13	0.16	1.30	1.40	2.8	2.8	0.60	2.00
PD122	1	1	0	3	FSCL			0.37	0.37	0	0	0	0	90	100	90	100	75	85	35	50	20	35	0.14	0.16	1.30	1.40	1.0	1.0	0.60	2.00
PD122	1	2	3	28	C			0.37	0.37	0	0	0	0	75	100	75	100	70	90	65	90	35	50	0.11	0.13	1.30	1.40	0.9	0.1	0.06	0.60
PD122	2	1	0	3	C	CL		0.32	0.32	0	0	0	0	90	100	75	100	75	100	70	100	35	60	0.08	0.10	1.30	1.40	0.0	1.0	0.06	0.20
PD122	2	2	3	11	C	CL		0.32	0.32	0	0	0	0	90	100	75	100	75	100	70	100	35	60	0.08	0.10	1.30	1.40	0.0	1.0	0.06	0.20
PD122	3	1	0	3	SIC	C	SICL	0.37	0.37	0	0	0	0	95	100	95	100	95	100	90	100	35	60	0.15	0.17	1.30	1.40	0.0	1.0	0.00	0.06
PD122	3	2	3	60	SIC	C	SICL	0.37	0.37	0	0	0	0	95	100	95	100	95	100	90	100	35	60	0.10	0.15	1.30	1.40	0.0	1.0	0.00	0.06
PD123	1	1	0	6	LFS	GR-SL		0.20	0.20	0	0	0	10	85	100	80	100	65	95	15	30	5	12	0.08	0.11	1.30	1.40	0.0	1.0	2.00	6.00
PD123	1	2	6	12	LFS	CN-LFS	GR-SL	0.28	0.28	0	0	0	10	70	90	65	90	60	90	10	30	5	12	0.06	0.11	1.30	1.40	0.0	1.0	2.00	6.00
PD123	2	1	0	4	CL	L		0.32	0.32	0	0	0	0	95	100	90	100	75	95	55	80	6	25	0.17	0.21	1.30	1.40	1.1	1.1	0.20	0.60
PD123	2	2	4	13	CL	C		0.37	0.37	0	0	0	0	95	100	90	100	90	100	75	95	35	50	0.19	0.21	1.30	1.40	0.9	0.9	0.06	0.20
PD123	3	1	0	4	SL			0.24	0.24	0	0	0	0	80	100	75	95	50	65	25	50	10	20	0.11	0.13	1.30	1.40	0.0	1.0	2.00	6.00
PD123	3	2	4	14	SCL	SL		0.28	0.28	0	0	0	0	80	100	75	95	60	85	35	50	18	35	0.14	0.16	1.30	1.40	0.0	1.0	0.60	2.00

PD124	1	1	0	4	SL			0.24	0.24	0	0	0	0	90	100	90	100	55	80	30	50	10	20	0.11	0.13	1.30	1.40	1.1	1.1	2.00	6.00
PD124	1	2	4	22	SCL			0.28	0.28	0	0	0	0	90	100	90	100	75	85	35	50	18	34	0.14	0.16	1.30	1.40	0.8	0.8	0.60	2.00
PD124	2	1	0	1	SL	SCL		0.24	0.24	0	0	0	0	100	100	100	100	60	70	30	40	18	34	0.11	0.13	1.30	1.40	0.0	1.0	2.00	6.00
PD124	2	2	1	11	SCL			0.28	0.28	0	0	0	0	100	100	100	100	75	90	35	50	18	34	0.14	0.16	1.30	1.40	0.0	1.0	0.60	2.00
PD124	3	1	0	4	SL			0.24	0.24	0	0	0	0	80	100	75	95	50	65	25	50	10	20	0.11	0.13	1.30	1.40	0.0	1.0	2.00	6.00
PD124	3	2	4	14	SCL	SL		0.28	0.28	0	0	0	0	80	100	75	95	60	85	35	50	18	35	0.14	0.16	1.30	1.40	0.0	1.0	0.60	2.00
PD125	1	1	0	3	SL	COSL		0.24	0.24	0	0	0	0	80	100	75	95	50	65	25	50	10	20	0.11	0.13	1.30	1.40	0.0	1.0	2.00	6.00
PD125	1	2	3	14	SCL	SL		0.28	0.28	0	0	0	0	80	100	75	95	60	85	35	50	18	35	0.14	0.16	1.30	1.40	0.0	1.0	0.60	2.00
PD125	2	1	0	6	SL	COSL	GR-SL	0.15	0.15	0	0	0	10	75	100	50	100	40	75	25	45	5	18	0.11	0.18	1.30	1.40	0.0	1.0	2.00	6.00
PD125	2	2	6	19	GRV-S	COSL	GRV-LS	0.05	0.05	0	0	10	40	25	50	25	50	10	30	0	10	0	5	0.03	0.05	1.30	1.40	0.0	1.0	6.00	20.00
PD127	1	1	0	3	L			0.37	0.37	0	0	0	0	95	100	95	100	80	90	60	70	15	30	0.16	0.18	1.30	1.40	1.8	1.8	0.60	2.00
PD127	1	2	3	8	CN-L	CN-CL		0.15	0.15	0	0	0	10	70	85	65	75	55	65	40	50	18	34	0.10	0.13	1.30	1.40	1.8	1.8	0.20	6.00
PD127	1	3	8	27	FLX-L	FLV-CL	FLV-L	0.10	0.10	0	0	45	60	70	85	40	50	30	40	20	30	18	30	0.07	0.09	1.30	1.40	2.4	2.4	0.20	6.00
PD127	2	1	0	2	L			0.24	0.24	0	0	0	10	85	100	70	100	45	90	20	50	18	34	0.10	0.15	1.30	1.40	0.0	1.0	0.60	6.00
PD127	2	2	2	14	SCL	L	SL	0.24	0.24	0	0	0	10	85	100	70	100	45	90	20	50	18	34	0.10	0.15	1.30	1.40	0.0	1.0	0.60	6.00
PD127	3	1	0	4	SL			0.24	0.24	0	0	0	0	90	100	90	100	55	80	30	50	10	20	0.11	0.13	1.30	1.40	1.1	1.1	2.00	6.00
PD127	3	2	4	22	SCL			0.28	0.28	0	0	0	0	90	100	90	100	75	85	35	50	18	34	0.14	0.16	1.30	1.40	0.8	0.8	0.60	2.00
PD128	1	1	0	4	SL			0.24	0.24	0	0	0	0	90	100	90	100	55	80	30	50	10	20	0.11	0.13	1.30	1.40	1.1	1.1	2.00	6.00
PD128	1	2	4	22	SCL			0.28	0.28	0	0	0	0	90	100	90	100	75	85	35	50	18	34	0.14	0.16	1.30	1.40	0.8	0.8	0.60	2.00
PD128	2	1	0	1	SL	SCL		0.24	0.24	0	0	0	0	100	100	100	100	60	70	30	40	18	34	0.11	0.13	1.30	1.40	0.0	1.0	2.00	6.00
PD128	2	2	1	11	SCL			0.28	0.28	0	0	0	0	100	100	100	100	75	90	35	50	18	34	0.14	0.16	1.30	1.40	0.0	1.0	0.60	2.00
PD128	3	1	0	4	SL			0.24	0.24	0	0	0	0	80	100	75	95	50	65	25	50	10	20	0.11	0.13	1.30	1.40	0.0	1.0	2.00	6.00
PD128	3	2	4	14	SCL	SL		0.28	0.28	0	0	0	0	80	100	75	95	60	85	35	50	18	35	0.14	0.16	1.30	1.40	0.0	1.0	0.60	2.00
PD129	1	1	0	4	GRV-SL			0.05	0.05	0	0	0	20	35	50	30	45	25	40	10	20	8	18	0.06	0.08	1.30	1.40	0.0	1.0	2.00	6.00
PD129	1	2	4	14	GRX-S			0.02	0.02	0	0	5	30	15	30	10	25	5	20	0	15	3	10	0.03	0.05	1.30	1.40	0.0	1.0	6.00	20.00
PD129	2	1	0	4	L	CL		0.32	0.32	0	0	0	0	75	100	75	100	75	100	55	75	18	35	0.16	0.18	1.30	1.40	0.0	1.0	0.60	2.00
PD129	2	2	4	22	L	CL		0.32	0.32	0	0	0	0	75	100	75	100	75	100	55	75	18	35	0.16	0.18	1.30	1.40	0.0	1.0	0.60	2.00
PD129	3	1	0	3	C	CL		0.32	0.32	0	0	0	0	90	100	75	100	75	100	70	100	35	60	0.08	0.10	1.30	1.40	0.0	1.0	0.06	0.20
PD129	3	2	3	11	C	CL		0.32	0.32	0	0	0	0	90	100	75	100	75	100	70	100	35	60	0.08	0.10	1.30	1.40	0.0	1.0	0.06	0.20
PD401	1	1	0	2	C	CL		0.37	0.37	0	0	0	0	100	100	100	100	91	100	65	78	24	40	0.13	0.15	1.05	1.15	1.0	2.0	0.60	2.00
PD401	1	2	2	9	SCL	CL		0.32	0.32	0	0	0	0	100	100	100	100	92	100	70	81	34	45	0.01	0.02	1.15	1.30	0.5	1.0	0.06	0.20
PD401	2	1	0	4	SL			0.28	0.28	0	0	0	0	88	100	75	100	66	93	29	43	14	19	0.09	0.11	1.25	1.35	1.0	2.0	2.00	6.00
PD401	2	2	4	6	SCL			0.28	0.28	0	0	0	0	100	100	100	100	88	100	43	57	20	34	0.13	0.15	1.25	1.40	0.5	1.0	0.60	2.00
PD401	2	3	6	12	CL			0.37	0.37	0	0	0	0	100	100	100	100	95	100	65	74	27	36	0.11	0.12	1.25	1.40	0.5	1.0	0.60	2.00
PD401	3	1	0	2	SC	CL	SCL	0.17	0.17	0	0	0	0	100	100	100	100	64	88	29	53	12	36	0.13	0.15	1.15	1.25	1.0	2.0	0.60	2.00
PD401	3	2	2	6	CL	C	SC	0.32	0.32	0	0	0	0	100	100	100	100	90	97	69	76	35	42	0.14	0.16	1.25	1.35	0.5	1.0	0.20	0.60
PD401	3	3	6	8	SCL	C	SC	0.24	0.24	0	0	0	0	100	100	100	100	75	100	39	67	16	44	0.11	0.16	1.30	1.40	0.0	0.5	0.60	2.00
PD401	3	4	8	26	CL	SCL		0.28	0.28	0	0	0	0	100	100	100	100	73	91	52	70	18	36	0.16	0.18	1.35	1.45	0.0	0.5	0.20	0.60
PD425	1	1	0	2	SL	SCL		0.15	0.15	0	0	0	0	76	100	75	100	51	80	19	38	10	22	0.11	0.13	1.25	1.35	1.0	2.0	2.00	6.00
PD425	1	2	2	3	SL	SCL	GR-SL	0.28	0.28	0	0	0	0	61	100	60	100	47	88	22	47	12	22	0.09	0.13	1.25	1.35	0.5	1.0	2.00	6.00
PD425	1	3	3	8	SCL	SL	L	0.24	0.24	0	0	0	0	83	100	82	100	62	92	30	53	16	32	0.14	0.16	1.31	1.38	0.5	1.0	0.60	2.00
PD425	1	4	8	17	SCL	CL	SL	0.24	0.24	0	0	0	0	91	100	91	100	67	95	32	56	16	37	0.14	0.16	1.31	1.38	0.5	1.0	0.60	2.00
PD425	2	1	0	2	LCOS	GR-LCOS		0.05	0.05	0	0	0	0	69	91	68	91	37	53	13	21	8	12	0.05	0.07	1.32	1.44	1.0	2.0	6.00	20.00
PD425	2	2	2	6	SL	GR-SL		0.20	0.20	0	0	0	0	68	100	66	100	47	76	18	33	10	15	0.10	0.13	1.28	1.34	1.0	2.0	2.00	6.00
PD425	2	3	6	16	SL	GR-SL		0.28	0.28	0	0	0	0	69	100	68	100	52	78	27	42	14	16	0.10	0.13	1.35	1.41	0.5	1.0	2.00	6.00
PD425	3	1	0	1	COSL	LCOS		0.15	0.17	0	0	0	0	91	100	91	100	52	61	25	32	8	12	0.09	0.11	1.30	1.36	1.0	2.0	6.00	20.00

PD425	3	2	1	3	SL			0.24	0.24	0	0	0	0	91	96	90	96	66	74	29	35	10	14	0.11	0.13	1.27	1.33	1.0	2.0	2.00	6.00
PD425	3	3	3	9	SL			0.24	0.24	0	0	0	0	96	100	96	100	71	78	33	38	12	16	0.11	0.13	1.27	1.33	0.0	0.5	2.00	6.00
PD427	1	1	0	2	COSL			0.10	0.10	0	0	0	0	87	97	74	94	49	66	21	31	8	12	0.08	0.11	1.25	1.35	1.0	2.0	6.00	20.00
PD427	1	2	2	9	SL	COSL		0.37	0.37	0	0	0	0	88	100	76	100	63	91	28	45	11	19	0.09	0.11	1.35	1.50	0.5	1.0	2.00	6.00
PD427	2	1	0	2	COSL	SL		0.15	0.15	0	0	0	0	88	100	75	100	46	66	23	34	8	12	0.08	0.11	1.25	1.35	1.0	2.0	6.00	20.00
PD427	2	2	2	6	SL	COSL		0.28	0.28	0	0	0	0	95	100	90	100	74	86	27	34	8	12	0.09	0.11	1.25	1.35	1.0	2.0	6.00	20.00
PD427	2	3	6	12	SL			0.32	0.32	0	0	0	0	96	100	91	100	77	90	33	41	10	15	0.09	0.11	1.35	1.50	0.5	1.0	2.00	6.00
PD427	3	1	0	2	COSL			0.15	0.15	0	0	0	0	91	100	82	100	53	69	24	34	8	12	0.08	0.11	1.25	1.35	1.0	2.0	6.00	20.00
PD427	3	2	2	16	SL			0.24	0.24	0	0	0	0	100	100	100	100	80	86	34	40	12	18	0.09	0.11	1.35	1.50	0.5	1.0	2.00	6.00
PD427	4	1	0	1	GR-COSL			0.15	0.15	0	0	0	0	76	100	75	100	51	80	19	38	8	16	0.11	0.13	1.30	1.40	1.0	2.0	2.00	6.00
PD427	4	2	1	3	GR-SL			0.28	0.28	0	0	0	0	61	100	60	100	47	88	22	47	8	16	0.09	0.13	1.30	1.40	0.5	1.0	2.00	6.00
PD427	4	3	3	6	GR-SCL			0.24	0.24	0	0	0	0	83	100	82	100	62	92	30	53	20	26	0.14	0.16	1.30	1.40	0.5	1.0	0.60	2.00
PD427	4	4	6	11	GRV-SCL			0.24	0.24	0	0	0	0	91	100	91	100	67	95	32	56	20	26	0.14	0.16	1.30	1.40	0.5	1.0	0.60	2.00
PD432	1	1	0	1	L	SIL	SICL	0.43	0.43	0	0	0	0	100	100	100	100	86	94	62	70	22	29	0.16	0.18	1.18	1.28	1.0	2.0	0.60	2.00
PD432	1	2	1	2	CL			0.43	0.43	0	0	0	0	100	100	100	100	86	98	65	77	28	32	0.19	0.21	1.20	1.30	1.0	2.0	0.60	2.00
PD432	1	2	2	10	CL			0.32	0.32	0	0	0	0	100	100	100	100	93	99	74	80	36	38	0.18	0.20	1.25	1.35	0.5	1.0	0.20	0.60
PD435	1	1	0	2	GR-LCOS	LCOS	COSL	0.10	0.15	0	0	0	0	63	91	61	91	36	60	14	27	3	10	0.05	0.07	1.35	1.45	1.0	2.0	6.00	20.00
PD435	1	2	2	4	COSL			0.32	0.32	0	0	0	0	88	96	87	96	58	73	33	46	6	15	0.09	0.11	1.30	1.40	1.0	2.0	6.00	20.00
PD435	1	3	4	14	GR-COSL	COSL		0.24	0.28	0	0	0	0	73	96	72	96	49	72	28	44	10	17	0.09	0.11	1.37	1.47	0.5	1.0	6.00	20.00
PD435	2	1	0	1	LCOS	COSL	SL	0.28	0.32	0	0	0	0	75	100	74	100	58	89	29	50	5	15	0.11	0.13	1.25	1.35	1.0	2.0	2.00	6.00
PD435	2	2	1	4	COSL	SL		0.28	0.32	0	0	0	0	91	100	90	100	71	88	34	48	8	18	0.11	0.13	1.27	1.37	1.0	2.0	2.00	6.00
PD435	2	3	4	11	SL	COSL		0.28	0.32	0	0	0	0	91	100	91	100	71	85	39	50	12	19	0.11	0.13	1.35	1.45	0.5	1.0	2.00	6.00
PD437	1	1	0	2	SL			0.20	0.24	0	0	0	0	83	96	82	96	61	79	28	41	10	18	0.11	0.13	1.34	1.40	1.0	2.0	2.00	6.00
PD437	1	2	2	6	SL			0.28	0.28	0	0	0	0	100	100	100	100	73	81	37	45	10	18	0.11	0.13	1.37	1.44	1.0	2.0	2.00	6.00
PD437	1	3	6	12	SCL	SL	CL	0.28	0.28	0	0	0	0	100	100	100	100	80	94	42	56	16	30	0.14	0.16	1.30	1.36	0.5	1.0	0.60	2.00
PD437	2	1	0	2	COSL	SL		0.15	0.20	0	0	0	0	87	100	87	100	62	76	28	36	12	16	0.11	0.13	1.27	1.33	1.0	2.0	2.00	6.00
PD437	2	2	2	4	SL			0.20	0.20	0	0	0	0	96	100	96	100	72	79	37	42	13	20	0.11	0.13	1.27	1.33	1.0	2.0	2.00	6.00
PD437	2	3	4	7	SC	SCL		0.20	0.20	0	0	0	0	100	100	96	100	70	85	37	50	24	36	0.14	0.16	1.33	1.39	0.5	1.0	0.20	0.60
PD437	2	4	7	25	SCL			0.24	0.24	0	0	0	0	100	100	94	100	73	86	37	47	20	28	0.14	0.16	1.34	1.40	0.5	1.0	0.60	2.00
PD438	1	1	0	2	SL	L		0.24	0.24	0	0	0	0	100	100	100	100	78	92	39	53	12	26	0.11	0.13	1.25	1.35	1.0	2.0	2.00	6.00
PD438	1	2	2	13	CL	SL	SCL	0.28	0.28	0	0	0	0	100	100	100	100	78	95	42	59	17	34	0.14	0.16	1.28	1.38	0.5	1.0	0.60	2.00
PD438	2	1	0	2	SL			0.20	0.20	0	0	0	0	100	100	90	94	69	76	34	40	14	19	0.09	0.11	1.20	1.35	1.0	2.0	2.00	6.00
PD438	2	2	2	9	SCL			0.28	0.28	0	0	0	0	100	100	100	100	85	93	44	52	20	28	0.14	0.16	1.30	1.30	0.5	1.0	0.60	2.00
PD438	3	1	0	2	SL	COSL		0.15	0.15	0	0	0	0	100	100	94	96	56	62	30	37	10	16	0.09	0.11	1.29	1.39	1.0	2.0	6.00	20.00
PD438	3	2	2	9	SL			0.24	0.24	0	0	0	0	100	100	100	100	75	77	39	41	15	17	0.11	0.13	1.35	1.45	0.5	1.0	2.00	6.00
PD438	4	1	0	2	SL	COSL		0.20	0.20	0	0	0	0	100	100	87	96	56	67	34	43	12	18	0.09	0.11	1.25	1.35	1.0	2.0	2.00	6.00
PD438	4	2	2	9	CL	SCL		0.28	0.28	0	0	0	0	100	100	96	100	86	100	50	66	24	38	0.14	0.16	1.28	1.38	0.5	1.0	0.60	2.00
PD438	5	1	0	2	SCL			0.24	0.24	0	0	0	0	100	100	96	100	82	92	44	52	20	26	0.14	0.16	1.20	1.30	1.0	2.0	0.60	2.00
PD438	5	2	2	17	SL			0.28	0.28	0	0	0	0	100	100	100	100	75	81	37	43	12	18	0.11	0.13	1.25	1.35	0.5	1.0	2.00	6.00
PD451	1	1	0	2	LFS			0.37	0.37	0	0	0	0	100	100	100	100	95	99	34	38	6	10	0.08	0.10	1.35	1.45	1.0	2.0	6.00	20.00
PD451	1	2	2	5	FSL			0.37	0.37	0	0	0	0	100	100	100	100	93	98	37	42	10	15	0.13	0.15	1.35	1.50	0.5	1.0	2.00	6.00
PD451	1	3	5	24	FS	S		0.15	0.15	0	0	0	0	100	100	100	100	91	95	14	18	5	9	0.06	0.08	1.45	1.60	0.0	0.5	6.00	20.00
PD451	2	1	0	2	FSL			0.32	0.32	0	0	0	0	100	100	100	100	91	98	36	43	10	17	0.13	0.15	1.25	1.35	0.0	2.0	2.00	6.00
PD451	2	2	2	11	SCL			0.28	0.28	0	0	0	0	100	100	100	100	87	97	42	52	20	30	0.16	0.18	1.25	1.40	0.5	1.0	0.60	2.00
PD451	3	1	0	2	FS			0.17	0.17	0	0	0	0	100	100	100	100	93	96	16	19	5	8	0.06	0.08	1.35	1.45	1.0	2.0	6.00	20.00
PD451	3	2	2	7	FSL			0.43	0.43	0	0	0	0	100	100	100	100	93	98	40	45	10	15	0.13	0.15	1.35	1.50	0.5	1.0	2.00	6.00

PD451	3	3	7	26	LFS	FS		0.17	0.17	0	0	0	0	100	100	100	100	91	96	14	19	5	10	0.06	0.08	1.45	1.60	0.0	0.5	6.00	20.00
PD522	1	1	0	4	COSL			0.15	0.15	0	0	0	0	100	100	90	100	59	70	31	40	10	15	0.09	0.11	1.20	1.35	1.0	2.0	6.00	20.00
PD522	1	2	4	17	SCL			0.24	0.24	0	0	0	0	100	100	91	100	76	88	37	46	20	25	0.14	0.16	1.25	1.40	0.5	1.0	0.60	2.00
PD522	2	1	0	2	COSL			0.20	0.20	0	0	0	0	100	100	90	96	58	67	29	35	10	15	0.08	0.11	1.23	1.37	1.0	2.0	6.00	20.00
PD522	2	2	2	5	COSL			0.20	0.20	0	0	0	0	100	100	90	98	60	69	31	37	15	19	0.08	0.11	1.23	1.37	0.5	1.0	2.00	6.00
PD522	2	3	5	11	SCL			0.28	0.28	0	0	0	0	100	100	91	100	77	90	38	46	20	24	0.14	0.19	1.27	1.40	0.5	1.0	0.60	2.00
PD522	3	1	0	4	COSL			0.15	0.15	0	0	0	0	91	95	82	90	52	59	26	31	15	17	0.08	0.11	1.23	1.37	1.0	2.0	2.00	6.00
PD522	3	2	4	8	SCL			0.15	0.20	0	0	0	0	88	95	76	91	63	80	31	42	20	25	0.16	0.18	1.27	1.40	0.5	1.0	0.60	2.00
PD522	3	3	8	16	GR-COSL			0.10	0.20	0	0	0	0	84	88	68	75	44	51	22	27	12	16	0.06	0.08	1.37	1.50	0.5	1.0	2.00	6.00
PD522	4	1	0	2	SL			0.28	0.32	0	0	0	0	95	100	90	100	78	90	32	40	10	14	0.08	0.13	1.23	1.37	1.0	2.0	2.00	6.00
PD522	4	2	2	7	COSL			0.15	0.15	0	0	0	0	96	100	91	100	64	74	31	37	15	18	0.08	0.12	1.37	1.50	0.5	1.0	2.00	6.00
PD522	4	3	7	12	SCL			0.28	0.28	0	0	0	0	95	100	91	100	78	88	38	44	20	22	0.14	0.19	1.27	1.40	0.5	1.0	0.60	2.00
PD522	5	1	0	7	SL			0.24	0.24	0	0	0	0	100	100	90	100	78	91	33	41	10	15	0.08	0.13	1.23	1.37	1.0	2.0	2.00	6.00
PD522	5	2	7	15	CL			0.32	0.32	0	0	0	0	100	100	91	100	86	98	63	72	35	38	0.17	0.21	1.27	1.40	0.5	1.0	0.20	0.60
PD533	1	1	0	2	COSL	SL		0.20	0.20	0	0	0	0	91	100	91	100	69	84	29	40	10	18	0.11	0.13	1.35	1.45	1.0	2.0	2.00	6.00
PD533	1	2	2	6	SL			0.24	0.24	0	0	0	0	91	100	91	100	71	84	35	44	12	18	0.11	0.13	1.38	1.48	1.0	2.0	2.00	6.00
PD533	1	3	6	12	SCL			0.28	0.28	0	0	0	0	100	100	100	100	86	94	45	53	22	30	0.14	0.16	1.30	1.40	0.5	1.0	0.60	2.00
PD533	2	1	0	2	GR-COSL	COSL	SL	0.15	0.15	0	0	0	0	68	91	66	90	45	67	22	35	8	14	0.08	0.11	1.25	1.35	1.0	2.0	6.00	20.00
PD533	2	2	2	8	SL	SCL		0.28	0.28	0	0	0	0	83	100	82	100	68	91	35	51	16	24	0.14	0.16	1.30	1.40	0.5	1.0	0.60	2.00
PD533	2	3	8	23	SCL			0.28	0.28	0	0	0	0	83	100	82	100	69	94	39	57	20	30	0.14	0.16	1.32	1.42	0.5	1.0	0.60	2.00
PD536	1	1	0	2	GR-COSL	COSL		0.10	0.15	0	0	0	0	68	94	66	94	39	60	20	33	11	16	0.09	0.11	1.25	1.35	1.0	2.0	2.00	6.00
PD536	1	2	2	4	COSL			0.17	0.17	0	0	0	0	75	96	74	96	41	62	22	37	10	19	0.09	0.11	1.25	1.35	1.0	2.0	2.00	6.00
PD536	1	3	4	8	L	SCL		0.37	0.37	0	0	0	0	80	96	48	96	41	89	29	66	21	28	0.16	0.18	1.25	1.35	0.5	1.0	0.60	2.00
PD536	1	4	8	11	SCL	CL	GR-SCL	0.28	0.28	0	0	0	0	62	96	60	96	48	87	27	53	22	32	0.14	0.16	1.27	1.37	0.5	1.0	0.60	2.00
PD536	2	1	0	1	SL			0.20	0.20	0	0	0	0	100	100	74	100	55	79	24	38	12	17	0.11	0.13	1.25	1.35	1.0	2.0	2.00	6.00
PD536	2	2	1	5	SCL			0.24	0.24	0	0	0	0	100	100	90	100	78	99	38	55	21	34	0.14	0.16	1.25	1.35	0.5	1.0	0.60	2.00
PD536	2	3	5	12	SCL			0.24	0.24	0	0	0	0	100	100	94	100	76	90	39	51	21	30	0.14	0.16	1.27	1.37	0.5	1.0	0.60	2.00
PD536	3	1	0	1	SL			0.15	0.20	0	0	0	0	82	100	82	100	58	77	25	36	10	16	0.11	0.13	1.25	1.35	1.0	2.0	2.00	6.00
PD536	3	2	1	4	SCL			0.24	0.24	0	0	0	0	100	100	96	100	81	91	40	47	20	26	0.14	0.16	1.20	1.30	1.0	2.0	0.60	2.00
PD536	3	3	4	9	SCL			0.24	0.24	0	0	0	0	100	100	98	100	77	86	39	47	22	29	0.14	0.16	1.28	1.38	0.5	1.0	0.60	2.00
PD543	1	1	0	2	L	GR-SL		0.20	0.28	0	0	0	0	83	91	65	81	47	68	27	43	12	24	0.11	0.13	1.20	1.30	1.0	2.0	2.00	6.00
PD543	1	2	2	8	CL	SCL	C	0.24	0.24	0	0	0	0	100	100	100	100	70	95	46	71	20	45	0.14	0.16	1.15	1.25	0.5	1.0	0.06	0.20
PD543	1	3	8	14	CL	C	SC	0.20	0.20	0	0	0	0	95	100	90	100	73	90	44	59	32	42	0.14	0.16	1.25	1.35	0.5	1.0	0.06	0.20
PD543	2	1	0	1	COSL	GR-SL		0.17	0.24	0	0	0	0	83	87	65	73	48	59	22	31	9	18	0.11	0.13	1.20	1.30	1.0	2.0	2.00	6.00
PD543	2	2	1	3	CL	SL		0.24	0.24	0	0	0	0	100	100	100	100	73	89	37	53	12	28	0.11	0.13	1.30	1.40	0.5	1.0	2.00	6.00
PD543	2	3	3	7	SCL	COSL		0.24	0.24	0	0	0	0	100	100	100	100	75	88	36	49	15	28	0.14	0.16	1.25	1.35	0.5	1.0	0.60	2.00
PD543	2	4	7	17	SCL			0.20	0.20	0	0	0	0	100	100	100	100	84	87	52	55	31	34	0.14	0.16	1.25	1.35	0.5	1.0	0.60	2.00
PD543	3	1	0	4	SL			0.24	0.24	0	0	0	0	88	95	75	90	56	73	28	40	11	17	0.11	0.13	1.25	1.35	1.0	2.0	2.00	6.00
PD543	3	2	4	13	CL			0.28	0.28	0	0	0	0	100	100	100	100	87	93	64	70	31	37	0.19	0.21	1.20	1.30	0.5	1.0	0.60	2.00
PD550	1	1	0	1	SL	GR-SL		0.20	0.20	0	0	0	0	75	100	74	100	58	84	27	43	10	16	0.11	0.13	1.25	1.35	1.0	2.0	2.00	6.00
PD550	1	2	1	3	SL			0.28	0.28	0	0	0	0	100	100	100	100	79	87	40	48	10	18	0.11	0.13	1.28	1.38	1.0	2.0	2.00	6.00
PD550	1	3	3	11	SCL			0.32	0.32	0	0	0	0	100	100	100	100	86	92	46	52	20	29	0.14	0.16	1.30	1.40	0.5	1.0	0.60	2.00
PD550	2	1	0	1	SL			0.20	0.20	0	0	0	0	82	100	82	100	65	84	28	39	10	15	0.11	0.13	1.25	1.35	1.0	2.0	2.00	6.00
PD550	2	2	1	5	SL			0.24	0.24	0	0	0	0	91	100	90	100	72	83	31	38	12	16	0.11	0.13	1.27	1.37	1.0	2.0	2.00	6.00
PD550	2	3	5	12	SCL	SL		0.28	0.28	0	0	0	0	100	100	100	100	83	93	42	52	18	28	0.14	0.16	1.30	1.40	0.5	1.0	0.60	2.00
PD550	3	1	0	2	SL	GR-SL		0.20	0.20	0	0	0	0	68	100	66	100	51	82	21	37	10	15	0.10	0.13	1.25	1.35	1.0	2.0	2.00	6.00
PD550	3	2	2	6	SL	SCL		0.24	0.24	0	0	0	0	84	100	83	100	66	88	33	48	16	24	0.11	0.13	1.37	1.47	0.5	1.0	2.00	6.00

PD550	3	3	6	14	SCL	SL		0.20	0.20	0	0	0	0	100	100	100	100	79	89	39	49	18	28	0.14	0.16	1.39	1.49	0.5	1.0	0.60	2.00
PD550	4	1	0	2	SL	GR-SL		0.15	0.24	0	0	0	0	75	89	74	88	57	74	24	34	10	16	0.11	0.13	1.25	1.35	1.0	2.0	2.00	6.00
PD550	4	2	2	4	SCL	CL		0.37	0.37	0	0	0	0	83	100	82	100	73	99	56	79	24	34	0.19	0.21	1.28	1.38	0.5	1.0	0.60	2.00
PD550	4	3	4	11	SCL	CL		0.37	0.37	0	0	0	0	100	100	100	100	88	98	69	79	24	34	0.19	0.21	1.30	1.40	0.5	1.0	0.60	2.00
PD562	1	1	0	2	SL	COSL	GR-COSL	0.20	0.24	0	0	0	0	68	100	67	100	51	84	22	40	8	15	0.10	0.13	1.29	1.39	1.0	2.0	2.00	6.00
PD562	1	2	2	3	COSL	SL		0.28	0.28	0	0	0	0	100	100	100	100	78	86	38	46	10	18	0.11	0.13	1.35	1.45	1.0	2.0	2.00	6.00
PD562	1	3	3	9	CL	SCL		0.37	0.37	0	0	0	0	100	100	100	100	85	95	44	54	20	30	0.14	0.16	1.32	1.42	0.5	1.0	0.60	2.00
PD562	1	4	9	23	CL	SCL		0.32	0.32	0	0	0	0	100	100	100	100	86	98	46	58	20	32	0.14	0.16	1.35	1.45	0.5	1.0	0.60	2.00
PD562	1	5	23	28	SCL	CL	COSL	0.20	0.24	0	0	0	0	78	100	77	100	49	78	25	47	16	30	0.08	0.11	1.50	1.60	0.0	0.5	2.00	6.00
PD562	2	1	0	1	SL	COSL		0.10	0.15	0	0	0	0	68	100	67	100	39	66	18	35	7	15	0.08	0.11	1.30	1.40	1.0	2.0	6.00	20.00
PD562	2	2	1	4	SCL	COSL	SL	0.20	0.20	0	0	0	0	83	100	82	100	49	66	25	38	12	26	0.09	0.11	1.33	1.43	0.5	1.0	2.00	6.00
PD562	2	3	4	13	CL	SCL		0.32	0.32	0	0	0	0	81	100	81	100	70	95	54	75	26	34	0.19	0.21	1.18	1.28	0.5	1.0	0.60	2.00
PD562	2	4	13	22	SCL	SL	L	0.24	0.24	0	0	0	0	100	100	100	100	78	90	41	53	18	30	0.14	0.16	1.27	1.37	0.5	1.0	0.60	2.00
PD562	2	5	22	31	SL			0.32	0.32	0	0	0	0	100	100	100	100	78	85	43	50	12	19	0.11	0.13	1.50	1.60	0.0	0.5	2.00	6.00
PD562	2	6	31	43	SL			0.24	0.24	0	0	0	0	100	100	100	100	74	81	35	42	12	19	0.11	0.13	1.50	1.60	0.0	0.5	2.00	6.00
PD562	2	7	43	50	SCL	SL		0.32	0.32	0	0	0	0	100	100	100	100	82	92	44	54	16	26	0.14	0.16	1.45	1.55	0.0	0.5	0.60	2.00
PD562	2	8	50	53	CL			0.37	0.37	0	0	0	0	100	100	100	100	89	97	67	75	27	35	0.19	0.21	1.35	1.45	0.0	0.5	0.60	2.00
PD565	1	1	0	3	SL	L		0.20	0.24	0	0	0	0	83	100	82	100	65	85	32	45	12	18	0.11	0.13	1.30	1.40	1.0	2.0	2.00	6.00
PD565	1	2	3	9	CL	SCL		0.43	0.43	0	0	0	0	94	100	94	100	85	96	67	77	24	30	0.19	0.21	1.29	1.39	0.5	1.0	0.60	2.00
PD565	2	1	0	2	SL			0.24	0.24	0	0	0	0	75	100	74	100	54	80	25	39	8	14	0.11	0.13	1.25	1.35	1.0	2.0	2.00	6.00
PD565	2	2	2	9	SCL	SL		0.32	0.32	0	0	0	0	100	100	100	100	84	92	44	52	16	24	0.14	0.16	1.28	1.38	0.5	1.0	0.60	2.00
PD565	3	1	0	1	SIL	SICL	L	0.32	0.37	0	0	0	0	80	100	80	100	72	100	50	74	20	31	0.16	0.18	1.10	1.20	1.0	2.0	0.60	2.00
PD565	3	2	1	2	CL	SICL	L	0.37	0.37	0	0	0	0	89	100	89	100	81	99	63	79	24	32	0.19	0.21	1.07	1.17	1.0	2.0	0.60	2.00
PD565	3	3	2	7	C	SICL		0.43	0.43	0	0	0	0	100	100	100	100	90	98	73	81	36	44	0.14	0.16	1.19	1.29	0.5	1.0	0.06	0.20
PD565	3	4	7	19	SIC	SICL		0.43	0.43	0	0	0	0	100	100	100	100	95	100	89	96	35	42	0.19	0.21	1.21	1.31	0.0	0.5	0.20	0.60
PD565	4	1	0	60	UWB			0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0	0.00	0.00
PD568	1	1	0	2	SL			0.37	0.37	0	0	0	0	93	100	87	100	60	78	26	38	10	18	0.11	0.13	1.23	1.36	1.0	2.0	2.00	6.00
PD568	1	2	2	6	SL			0.43	0.43	0	0	0	0	98	100	96	100	70	81	40	49	14	22	0.11	0.13	1.23	1.36	1.0	2.0	2.00	6.00
PD568	1	3	6	17	SCL	L		0.49	0.49	0	0	0	0	100	100	100	100	81	89	45	53	20	28	0.14	0.16	1.40	1.53	0.5	1.0	0.60	2.00
PD568	2	1	0	1	SL	GR-COSL		0.28	0.37	0	0	0	0	80	100	60	100	43	80	19	40	10	18	0.11	0.13	1.23	1.36	1.0	2.0	2.00	6.00
PD568	2	2	1	9	SCL	CL		0.49	0.49	0	0	0	0	97	100	95	100	77	91	43	55	20	30	0.14	0.16	1.40	1.53	0.5	1.0	0.60	2.00
PD568	3	1	0	1	FSL	L		0.20	0.28	0	0	0	0	87	100	73	100	62	89	42	61	14	18	0.14	0.16	1.14	1.21	1.0	2.0	0.60	2.00
PD568	3	2	1	4	SL	L		0.49	0.49	0	0	0	0	95	100	90	100	70	79	44	51	16	18	0.11	0.13	1.23	1.36	1.0	2.0	2.00	6.00
PD568	3	3	4	10	SCL	CL		0.49	0.49	0	0	0	0	96	100	91	100	77	92	44	56	24	32	0.14	0.16	1.40	1.53	0.5	1.0	0.60	2.00
PD569	1	1	0	1	SL	COSL		0.20	0.20	0	0	0	0	100	100	73	94	52	72	22	34	12	18	0.11	0.13	1.23	1.27	1.0	2.0	0.60	2.00
PD569	1	2	1	5	SCL	SL		0.32	0.32	0	0	0	0	100	100	94	94	76	83	38	45	14	21	0.14	0.16	1.32	1.39	1.0	2.0	0.60	2.00
PD569	1	3	5	12	SCL			0.28	0.28	0	0	0	0	100	100	100	100	87	100	46	59	22	35	0.14	0.16	1.30	1.37	0.5	1.0	0.60	2.00
PD569	2	1	0	2	COSL	SL		0.20	0.20	0	0	0	0	75	94	74	94	54	73	24	34	10	14	0.11	0.13	1.26	1.33	1.0	2.0	2.00	6.00
PD569	2	2	2	6	SL	SCL		0.20	0.20	0	0	0	0	91	96	90	96	69	81	32	41	14	22	0.11	0.13	1.26	1.33	1.0	2.0	2.00	6.00
PD569	2	3	6	17	SCL	CL		0.24	0.24	0	0	0	0	91	100	91	100	70	94	34	55	19	36	0.14	0.16	1.30	1.35	0.5	1.0	0.60	2.00
PD569	3	1	0	1	COSL	SL		0.15	0.20	0	0	0	0	91	91	60	90	43	71	19	34	10	16	0.09	0.13	1.26	1.34	1.0	2.0	2.00	6.00
PD569	3	2	1	3	COSL	SL		0.24	0.24	0	0	0	0	75	96	74	96	55	76	26	38	12	16	0.11	0.13	1.26	1.34	1.0	2.0	2.00	6.00
PD569	3	3	3	9	SL	SCL		0.24	0.24	0	0	0	0	51	94	48	94	34	82	14	42	12	28	0.10	0.16	1.30	1.38	0.5	1.0	0.60	2.00
PD569	4	1	0	1	COSL	LCOS		0.05	0.10	0	0	0	0	100	100	75	100	39	56	13	21	6	10	0.05	0.07	1.37	1.44	1.0	2.0	6.00	20.00
PD569	4	2	1	6	LCOS			0.15	0.15	0	0	0	0	100	100	83	100	45	61	18	28	6	12	0.05	0.07	1.41	1.49	0.0	0.5	6.00	20.00
PD569	4	3	6	19	COS			0.10	0.15	0	0	0	0	100	100	85	100	40	54	9	17	4	10	0.03	0.05	1.61	1.69	0.0	0.5	20.00	20.00
PD581	1	1	0	1	GR-C	C	L	0.17	0.28	0	0	0	17	63	81	58	78	44	73	32	57	24	42	0.11	0.13	1.00	1.10	1.0	2.0	0.06	0.20
PD581	1	2	1	2	C	GR-COSL		0.24	0.32	0	0	0	18	73	90	69	89	63	83	49	64	40	44	0.11	0.13	1.05	1.15	0.5	1.0	0.06	0.20

PD581	1	3	2	8	C			0.32	0.32	0	0	0	0	100	100	100	100	91	95	70	74	40	44	0.14	0.16	1.10	1.20	0.5	1.0	0.06	0.20
PD581	1	4	8	12	C	CL		0.32	0.32	0	0	0	0	100	100	100	100	88	94	67	73	38	44	0.14	0.16	1.25	1.35	0.0	0.5	0.06	0.20
PD581	2	1	0	1	C	CL		0.28	0.28	0	0	0	0	95	100	89	100	81	99	63	78	36	44	0.18	0.20	1.10	1.20	1.0	2.0	0.20	0.60
PD581	2	2	1	3	C			0.32	0.32	0	0	0	0	95	100	89	100	81	97	65	79	40	46	0.14	0.16	1.10	1.20	0.5	1.0	0.06	0.20
PD581	2	3	3	7	C			0.32	0.32	0	0	0	0	100	100	100	100	91	97	73	79	40	46	0.14	0.16	1.15	1.25	0.5	1.0	0.06	0.20
PD581	2	4	7	13	CN-C	C		0.20	0.32	0	0	0	0	100	100	100	100	93	97	75	79	40	44	0.11	0.13	1.20	1.30	0.5	1.0	0.06	0.20
PD581	3	1	0	1	C	CB-C		0.28	0.28	0	0	6	18	72	100	68	100	62	93	48	72	40	44	0.14	0.16	1.00	1.10	0.0	2.0	0.06	0.20
PD581	3	2	1	6	CL	C		0.28	0.28	0	0	0	17	87	100	85	100	75	97	56	74	36	44	0.18	0.20	1.20	1.30	0.5	1.0	0.20	0.60
PD581	3	3	6	14	C			0.32	0.32	0	0	0	0	91	100	90	100	82	97	63	76	40	46	0.14	0.16	1.15	1.25	0.5	1.0	0.06	0.20
PD581	4	1	0	60	UWB			0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0	0.00	0.00
PD584	1	1	0	1	SL	COSL		0.15	0.20	0	0	0	0	75	100	74	100	46	68	26	41	10	16	0.09	0.11	1.29	1.37	1.0	2.0	6.00	20.00
PD584	1	2	1	3	SL	COSL		0.24	0.24	0	0	0	0	100	100	90	100	58	65	35	40	14	15	0.09	0.11	1.27	1.33	1.0	2.0	2.00	6.00
PD584	1	3	3	8	SCL			0.28	0.28	0	0	0	0	100	100	91	100	70	93	37	57	18	34	0.14	0.16	1.30	1.37	0.5	1.0	0.60	2.00
PD584	1	4	8	24	SCL			0.28	0.28	0	0	0	0	100	100	100	100	77	90	38	51	16	29	0.14	0.16	1.30	1.37	0.5	1.0	0.60	2.00
PD584	2	1	0	2	SL	CB-SL		0.10	0.10	0	0	10	22	65	91	64	90	45	67	18	29	12	16	0.07	0.09	1.39	1.47	1.0	2.0	2.00	6.00
PD584	2	2	2	5	SCL	CL		0.24	0.24	0	0	0	0	95	100	90	100	75	99	37	57	20	36	0.14	0.16	1.27	1.34	0.5	1.0	0.60	2.00
PD584	2	3	5	9	SCL	CL		0.24	0.24	0	0	0	0	95	100	90	100	76	96	37	53	22	34	0.14	0.16	1.27	1.34	0.5	1.0	0.60	2.00
PD584	3	1	0	1	L			0.28	0.28	0	0	0	0	86	96	85	96	72	86	50	62	20	26	0.16	0.18	1.15	1.19	1.0	2.0	0.60	2.00
PD584	3	2	1	3	L			0.32	0.32	0	0	0	0	90	100	90	100	76	90	52	65	20	26	0.16	0.18	1.17	1.24	1.0	2.0	0.60	2.00
PD584	3	3	3	6	CL			0.24	0.24	0	0	0	0	100	100	100	100	87	93	64	70	32	38	0.18	0.20	1.27	1.33	0.5	1.0	0.20	0.60
PD584	3	4	6	11	SCL			0.24	0.24	0	0	0	0	100	100	100	100	83	91	47	55	24	32	0.14	0.16	1.30	1.36	0.5	1.0	0.60	2.00
PD584	4	1	0	2	LCOS	GR-SL		0.10	0.15	0	0	0	0	89	100	82	100	44	63	16	28	8	17	0.05	0.07	1.30	1.40	1.0	2.0	6.00	20.00
PD584	4	2	2	6	GR-SL	L		0.20	0.28	0	0	0	0	80	100	74	100	57	87	27	48	10	21	0.11	0.13	1.30	1.40	1.0	2.0	2.00	6.00
PD584	4	3	6	12	LCOS	SCL	L	0.15	0.17	0	0	0	0	93	100	92	100	49	70	18	35	6	22	0.05	0.07	1.50	1.60	0.0	0.5	6.00	20.00
PD584	5	1	0	60	UWB			0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0	0.00	0.00
PD587	1	1	0	3	L	SL	SCL	0.24	0.32	0	0	0	0	73	100	72	100	59	97	39	69	15	30	0.16	0.18	1.15	1.25	1.0	2.0	0.60	2.00
PD587	1	2	3	7	CL	SCL		0.32	0.37	0	0	0	0	75	100	74	100	67	99	51	77	27	35	0.19	0.21	1.25	1.35	0.5	1.0	0.60	2.00
PD587	1	3	7	13	CL	SCL		0.37	0.37	0	0	0	0	91	100	90	100	80	97	61	75	27	35	0.19	0.21	1.25	1.35	0.5	1.0	0.60	2.00
PD587	2	1	0	2	GR-SL	GR-COSL		0.15	0.24	0	0	0	0	61	75	60	74	44	60	18	28	7	15	0.09	0.13	1.25	1.35	1.0	2.0	2.00	6.00
PD587	2	2	2	5	GR-SL	COSL		0.15	0.24	0	0	0	0	75	83	74	82	55	65	25	32	10	16	0.11	0.13	1.28	1.38	1.0	2.0	2.00	6.00
PD587	2	3	5	13	SL	COSL		0.24	0.28	0	0	0	0	84	100	83	100	63	81	31	44	13	19	0.11	0.13	1.37	1.47	0.5	1.0	2.00	6.00
PD587	3	1	0	60	UWB			0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0	0.00	0.00
PD615	1	1	0	1	GR-COSL	COSL	SL	0.24	0.24	0	0	0	0	87	98	74	96	51	75	24	40	10	19	0.11	0.13	1.20	1.30	1.0	2.0	2.00	6.00
PD615	1	2	1	3	GR-SCL	CL	SCL	0.32	0.32	0	0	0	0	91	98	81	96	70	92	39	55	20	30	0.14	0.16	1.20	1.30	0.5	1.0	0.60	2.00
PD615	1	3	3	8	CL	SCL		0.32	0.32	0	0	0	0	88	98	75	96	56	88	41	68	20	36	0.18	0.20	1.25	1.35	0.5	1.0	0.20	0.60
PD615	1	4	8	16	CL	SCL		0.32	0.32	0	0	0	0	91	98	82	96	65	91	48	71	24	39	0.18	0.20	1.30	1.40	0.5	1.0	0.20	0.60
PD615	2	1	0	1	GR-LCOS	COSL	GR-COSL	0.15	0.15	0	0	0	0	91	100	60	73	34	48	20	30	8	16	0.09	0.11	1.20	1.30	1.0	2.0	2.00	6.00
PD615	2	2	1	3	COSL			0.24	0.24	0	0	0	0	88	95	75	90	45	61	27	39	10	18	0.11	0.13	1.25	1.35	0.5	1.0	2.00	6.00
PD615	2	3	3	7	SL	SCL	COSL	0.32	0.32	0	0	0	0	87	95	74	90	61	86	32	52	16	30	0.14	0.16	1.20	1.30	0.5	1.0	0.60	2.00
PD615	2	4	7	13	GR-COSL	CL	GR-SCL	0.17	0.17	0	0	0	0	81	87	60	74	50	69	27	40	16	30	0.11	0.13	1.30	1.40	0.5	1.0	0.60	2.00
PD615	3	1	0	1	LCOS	COSL		0.20	0.20	0	0	0	0	87	95	74	90	44	59	24	35	8	14	0.09	0.11	1.20	1.30	1.0	2.0	6.00	20.00
PD615	3	2	1	3	SL	SCL	COSL	0.24	0.24	0	0	0	0	91	100	82	100	49	70	28	44	10	20	0.09	0.11	1.25	1.35	0.5	1.0	2.00	6.00
PD615	3	3	3	6	SCL	COSL	SL	0.24	0.24	0	0	0	0	91	95	82	91	62	81	32	47	16	30	0.11	0.13	1.30	1.40	0.5	1.0	2.00	6.00
PD615	3	4	6	20	GR-SCL			0.24	0.24	0	0	0	0	83	87	66	74	57	72	30	43	20	32	0.14	0.16	1.25	1.35	0.5	1.0	0.60	2.00
PD615	4	1	0	60	UWB			0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0	0.00	0.00

PD615	5	1	0	60	UWB			0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0	0.00	0.00
PD701	1	1	0	1	GR-LCOS			0.05	0.10	0	0	0	0	67	79	60	74	29	40	10	16	8	14	0.05	0.07	1.30	1.40	1.0	2.0	6.00	20.00
PD701	1	2	1	4	COSL			0.15	0.15	0	0	0	0	100	100	91	96	52	58	28	33	16	20	0.09	0.11	1.34	1.44	0.5	1.0	2.00	6.00
PD701	1	3	4	6	LCOS			0.10	0.10	0	0	0	0	100	100	91	100	42	53	12	21	10	18	0.05	0.07	1.45	1.55	0.5	1.0	6.00	20.00
PD701	1	4	6	20	GRV-SCL			0.24	0.24	0	0	0	0	100	100	91	96	73	83	35	43	22	28	0.07	0.11	1.35	1.45	0.5	1.0	0.60	2.00
PD701	2	1	0	3	LCOS			0.15	0.15	0	0	0	0	100	100	91	96	51	57	21	26	6	10	0.05	0.07	1.35	1.45	1.0	2.0	6.00	20.00
PD701	2	2	3	8	COSL			0.20	0.20	0	0	0	0	100	100	96	100	54	64	26	35	8	16	0.09	0.11	1.37	1.47	0.5	1.0	6.00	20.00
PD701	2	3	8	11	COSL			0.20	0.20	0	0	0	0	100	100	96	100	52	64	25	35	8	18	0.09	0.11	1.41	1.51	0.5	1.0	2.00	6.00
PD701	3	1	0	1	COSL			0.10	0.10	0	0	0	0	100	100	82	100	46	62	25	36	14	19	0.09	0.11	1.25	1.35	1.0	2.0	2.00	6.00
PD701	3	2	1	4	SCL			0.28	0.28	0	0	0	0	100	100	96	100	80	91	40	49	20	28	0.14	0.16	1.26	1.36	0.5	1.0	0.60	2.00
PD701	3	3	4	6	SCL			0.28	0.28	0	0	0	0	100	100	96	100	81	92	41	50	20	28	0.14	0.16	1.29	1.39	0.5	1.0	0.60	2.00
PD701	3	4	6	11	SCL			0.15	0.15	0	0	0	0	100	100	96	100	73	85	36	47	26	35	0.14	0.16	1.32	1.42	0.0	0.5	0.60	2.00
PD701	4	1	0	60	UWB			0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0	0.00	0.00
PD702	1	1	0	1	SL	L	SCL	0.24	0.32	0	0	0	0	74	100	73	100	59	93	33	58	14	26	0.14	0.16	1.10	1.20	1.0	2.0	0.60	2.00
PD702	1	2	1	3	L	CL		0.37	0.37	0	0	0	0	100	100	100	100	88	100	65	79	22	36	0.16	0.18	1.20	1.30	0.5	1.0	0.60	2.00
PD702	1	3	3	7	SCL	CL		0.32	0.32	0	0	0	0	100	100	100	100	88	92	65	69	26	30	0.19	0.21	1.25	1.35	0.5	1.0	0.60	2.00
PD702	1	4	7	20	L	SCL	CL	0.32	0.32	0	0	0	0	100	100	100	100	84	92	59	67	22	30	0.16	0.18	1.30	1.40	0.5	1.0	0.60	2.00
PD702	2	1	0	3	L	SCL		0.28	0.28	0	0	0	0	87	100	73	100	64	91	47	68	23	26	0.16	0.18	1.10	1.20	1.0	2.0	0.60	2.00
PD702	2	2	3	13	L	CL		0.28	0.28	0	0	0	0	95	100	90	100	75	93	57	73	26	36	0.19	0.21	1.25	1.35	0.5	1.0	0.60	2.00
PD702	3	1	0	5	GR-L	SL	CNV-SCL	0.10	0.24	0	0	5	20	75	95	33	84	26	73	12	38	16	24	0.08	0.10	1.10	1.20	1.0	2.0	0.60	2.00
PD702	3	2	5	12	SCL	CL		0.24	0.28	0	0	0	5	87	100	86	100	73	93	39	54	22	30	0.14	0.16	1.20	1.30	0.5	1.0	0.60	2.00
PDBL	1	1	0	9	UWB			0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0	0.00	0.00

Soil properties to a depth of 9 inches are averaged.
The percent passing designated sieves in this table is used to calculate the KINEROS parameter for the rock fraction in the soil.

From the averaged layers and percentage composition of soils for each map unit, a texture is determined. From this texture, the other KINEROS parameters are estimated in AGWA, according to the kin-lut.dbf table (Table B-3).

Table B-3: AGWA Conversion from Soil Texture to KINEROS Input

TEXTURE	KS	G	POR	SMAX	CV	SAND	SILT	CLAY	DIST	KFF
C	0.600	407.0	0.475	0.810	0.500	27.00	23.00	50.00	0.160	0.340
CBV	210.000	46.0	0.437	0.950	0.690	91.00	1.00	8.00	0.690	0.050
CEM	0.000	0.0	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.280
CIND	210.000	46.0	0.437	0.950	0.690	91.00	1.00	8.00	0.690	0.020
CL	2.300	259.0	0.464	0.840	0.940	32.00	34.00	34.00	0.240	0.390
COS	210.000	46.0	0.437	0.950	0.690	91.00	1.00	8.00	0.690	0.150
COSL	26.000	127.0	0.453	0.910	1.900	65.00	23.00	12.00	0.380	0.240
FB	0.600	407.0	0.475	0.810	0.500	27.00	23.00	50.00	0.160	0.050
FRAG	210.000	46.0	0.437	0.950	0.690	91.00	1.00	8.00	0.690	0.050
FS	210.000	46.0	0.437	0.950	0.690	91.00	1.00	8.00	0.690	0.200
FSL	26.000	127.0	0.453	0.910	1.900	65.00	23.00	12.00	0.380	0.350
G	210.000	46.0	0.437	0.950	0.690	27.00	23.00	50.00	0.160	0.150
GYP	0.000	0.0	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.050
HM	0.600	407.0	0.475	0.810	0.500	27.00	23.00	50.00	0.160	0.020
ICE	0.000	0.0	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.000
IND	0.300	100.0	0.200	0.300	0.200	0.00	0.00	0.00	0.000	0.250
L	13.000	108.0	0.463	0.940	0.400	42.00	39.00	19.00	0.250	0.420
LCOS	61.000	63.0	0.437	0.920	0.850	83.00	7.00	10.00	0.550	0.180
LFS	61.000	63.0	0.437	0.920	0.850	83.00	7.00	10.00	0.550	0.250
LS	61.000	63.0	0.437	0.920	0.850	83.00	7.00	10.00	0.550	0.230
LVFS	61.000	63.0	0.437	0.920	0.850	83.00	7.00	10.00	0.550	0.440
MUCK	0.600	407.0	0.475	0.810	0.500	27.00	23.00	50.00	0.160	0.020
PC	26.000	127.0	0.453	0.910	1.900	65.00	23.00	12.00	0.380	0.320
PEAT	0.600	407.0	0.475	0.810	0.500	27.00	23.00	50.00	0.160	0.020
S	210.000	46.0	0.437	0.950	0.690	91.00	1.00	8.00	0.690	0.180
SC	1.200	302.0	0.430	0.750	1.000	50.00	4.00	46.00	0.340	0.360
SCL	4.300	263.0	0.398	0.830	0.600	59.00	11.00	30.00	0.400	0.360
SI	3.000	260.0	0.450	0.920	0.550	8.00	81.00	11.00	0.130	0.430
SIC	0.900	375.0	0.479	0.880	0.920	9.00	45.00	46.00	0.150	0.310
SICL	1.500	345.0	0.471	0.920	0.480	12.00	54.00	34.00	0.180	0.400
SIL	6.800	203.0	0.501	0.970	0.500	23.00	61.00	16.00	0.230	0.490
SL	26.000	127.0	0.453	0.910	1.900	65.00	23.00	12.00	0.380	0.320
SPM	0.600	407.0	0.475	0.810	0.500	27.00	23.00	50.00	0.160	0.020
SR	26.000	127.0	0.453	0.910	1.900	65.00	23.00	12.00	0.380	0.330
UWB	0.000	0.0	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.020
VAR	0.000	0.0	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.550
VFS	210.000	46.0	0.437	0.950	0.690	91.00	1.00	8.00	0.690	0.460
VFSL	26.000	127.0	0.453	0.910	1.900	65.00	23.00	12.00	0.380	0.500
WB	0.000	0.0	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.020
MPT	0.600	407.0	0.475	0.810	0.500	27.00	23.00	50.00	0.160	0.020
COARSE	67.100	92.7	0.445	0.920	1.357	75.16	14.15	10.69	0.486	0.268
MEDIUM	9.056	205.7	0.463	0.917	0.738	36.57	42.98	20.45	0.272	0.416
FINE	0.824	382.8	0.470	0.818	0.610	27.02	25.41	47.57	0.181	0.345
D/SS	210.000	46.0	0.437	0.950	0.690	91.00	1.00	8.00	0.690	0.180
SALT	0.000	0.0	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.050
ROCK	0.000	0.0	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.020
GLACIER	0.000	0.0	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.000
WATER	0.000	0.0	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.000
NO DATA	0.000	0.0	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.000

ATTACHMENT C: LAND COVER DATABASE TABLES

CLASS	NAME	A	B	C	D	COVER	INT	N	IMPERV
11	Open Water	100	100	100	100	0	0.00	0.000	0.00
12	Perennial Ice/Snow	98	98	98	98	0	0.00	0.000	0.00
21	Low Intensity Residential	77	85	90	92	15	0.10	0.150	0.40
22	High Intensity Residential	81	88	91	93	10	0.08	0.120	0.75
23	Commercial/Industrial/Transportation	89	92	94	95	2	0.05	0.010	0.80
31	Bare Rock/Sand/Clay	96	96	96	96	2	0.00	0.010	0.00
32	Quarries/Strip Mines/Gravel Pits	78	85	90	92	2	0.00	0.010	0.00
33	Transitional	72	82	87	90	20	0.00	0.010	0.00
41	Deciduous Forest	55	55	75	80	50	1.15	0.015	0.00
42	Evergreen Forest	55	55	70	77	50	1.15	0.015	0.00
43	Mixed Forest	55	55	75	80	50	1.15	0.015	0.00
51	Shrubland	63	77	85	88	25	3.00	0.055	0.00
61	Orchards/Vineyards/Other	77	77	84	88	70	2.80	0.040	0.00
71	Grasslands/Herbaceous	49	69	79	84	25	2.00	0.015	0.00
81	Pasture/Hay	68	79	86	89	70	2.80	0.040	0.00
82	Row Crops	72	81	88	91	50	0.76	0.040	0.00
83	Small Grains	65	76	84	88	90	4.00	0.040	0.00
84	Fallow	76	85	90	93	30	0.50	0.040	0.00
85	Urban/Recreational Grasses	68	79	86	89	90	2.50	0.040	0.01
91	Woody Wetlands	85	85	90	92	70	1.15	0.060	0.00
92	Emergent Herbaceous Wetlands	77	77	84	90	70	1.15	0.060	0.00

ATTACHMENT D: DISTURBANCE PERCENTAGES

	Estimated Existing Well-Field Disturbance (acres)	Potential Estimated Surface Disturbance (acres) by Alternatives (including Existing Dist.)				
Basin and Hydrologic Unit Code		**No Action 2011**	**Proposed Action 2011**	**Alternative C 2011**	**Proposed Action 2023**	**Alternative C 2023**
Green River-Tyler Draw 140401010403	21.7	66.7	66.7	66.7	66.8	66.7
Green River-The Mesa 140401010404	10.1	17.6	17.6	17.6	17.6	17.6
Sand Draw-Alkali Creek 140401010701	502.2	1021.2	929.3	946.9	1,579.00	1,779.30
North Alkali Draw 140401010705	116.5	267.4	215.1	250.1	348.1	392.2
New Fork River-Duck Creek 140401020102	92.4	233.5	131	131	273.4	207.1
Hay Gulch 140401020105	3.9	3.9	3.9	3.9	3.9	3.9
Lower Pine Creek 140401020203	3.7	3.7	3.7	3.7	3.7	3.7
New Fork River-Stewart Point 140401020301	361.9	553.2	569.5	569.5	1296.2	1240.5
East Fork River 140401020302	12	12	12	12	12	12
New Fork River-Alkali Creek 140401020303	2,353.60	4,584.00	6,239.40	6,583.70	8,542.70	8,394.00
Sand Springs Draw 140401020304	81.3	86.5	174.6	183.7	321.7	417.7
New Fork River-Blue Ridge 140401020305	228.8	365.1	479.8	446.6	762.3	734.1
Mack Reservoir 140401020306	850.3	1788.8	2,444.00	2,082.80	3,492.60	3,350.00
Lower Pole Creek 140401020403	0.9	0.9	0.9	0.9	0.9	0.9

South Muddy Creek 140401020602	0	0	0	0	0	0
Lower Muddy Creek-New Fork 140401020603	0	7	7	7	7	7
Big Sandy River-Waterhole Draw 140401040105	1.5	4.2	1.8	1.8	1.8	1.8
Big Sandy River-Bull Draw 140401040106	74.2	85.1	108.7	108.7	108.7	108.7
Mud Hole Draw 140401040107	344.4	443.1	499.4	499.4	499.4	593.8
Long Draw 140401040109	0	0	0	0	0	0
Total Modeled Disturbance	**5059.4**	**8824.2**	**10151.3**	**10155.3**	**15030.9**	**15024.4**

Total modeled disturbance is not exactly equal to total estimated potential disturbance, since estimates changed from the time modeling was conducted. However, modeling is considered conservative, and small increases in estimated potential disturbance would not change modeling results.

ATTACHMENT E: SALINITY ESTIMATION

Table E-1: Salinity per Map Unit

Map Unit ID (MUID)	Soil Series	Soil Series Percent Composition per Map Unit	Estimated Salinity for Soil Series (ERO 1988) (mS/cm)	Estimated Numeric Value for Salinity (μS/cm)	Average Salinity (μS/cm) for Map Unit
PD100	Horsley	40%	2-4	3000	4600
	Badland	33%			
	Boltus	27%	8-16	12000	
PD102	Langspring Variant	72%	<2	1000	1000
	Langspring	28%	<2	1000	
PD103	Terada	44%	<2	1000	1700
	Huguston	37%	2-4	3000	
	Fraddle	19%	<2	1000	
PD104	Chrisman	100%	<2	1000	1000
PD106	Monte	67%	<2	1000	1000
	Leckman	33%	<2	1000	
PD107	Leckman	100%	<2	1000	1000
PD108	Dines	45%	8-16	12000	7600
	Clowers	33%	4-8	6000	
	Quealman	22%	<2	1000	
PD110	Fraddle	72%	<2	1000	1000
	Tresano	28%	<2	1000	
PD111	Fraddle	50%	<2	1000	1000
	Space City	28%	<2	1000	
	Koonich	22%	<2	1000	
PD112	Koonich	22%	<2	1000	1000
PD113	Haterton	53%	2-4	3000	3000
	Garsid	47%	2-4	3000	
PD114	Ouard	35%	<2	1000	4300
	Ouard Variant	35%	<2	1000	
	Boltus	30%	8-16	12000	
PD116	Huguston	44%	2-4	3000	2660
	Horsley	39%	2-4	3000	
	Terada	17%	<2	1000	
PD117	Huguston	53%	2-4	3000	5800
	Rock Outcrop	23%			
	Boltus	24%	8-16	12000	
PD119	Garsid	53%	2-4	3000	2060
	Monte	47%	<2	1000	
PD120	Kandaly	50%	<2	1000	1400
	Terada	28%	<2	1000	
	Huguston	22%	2-4	3000	
PD121	Garsid	47%	2-4	3000	1940
	Terada	29%	<2	1000	
	Langspring Variant	24%	<2	1000	
PD122	Baston	44%	<2	1000	4410
	Boltus	31%	8-16	12000	
	Chrisman	25%	<2	1000	

PD123	Spool Variant	41%	<2	1000	1540
	Ouard Variant	41%	<2	1000	
	San Arcacio Variant	18%	<8	4000	
PD124	Fraddle	35%	<2	1000	1900
	Ouard	35%	<2	1000	
	San Arcacio Variant	30%	<8	4000	
PD125	San Arcacio	56%	<8	4000	2680
	Saguache	44%	<2	1000	
PD127	Vermillion Variant	39%	<2	1000	1000
	Seedskadee	39%	<2	1000	
	Fraddle	22%	<2	1000	
PD128	Fraddle	56%	<2	1000	1660
	Ouard	22%	<2	1000	
	San Arcacio Variant	22%	<8	4000	
PD129	Dunul Variant	47%	<2	1000	4100
	Garsid	30%	2-4	3000	
	Boltus	23%	8-16	12000	